

AN IRREGULAR COUNTRY HOUSE—See Page 490.

A HELPING HAND

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FOR

TOWN AND COUNTRY:

AN

AMERICAN HOME BOOK

OF

PRACTICAL AND SCIENTIFIC INFORMATION

CONCERNING

HOUSE AND LAWN; GARDEN AND ORCHARD; FIELD, BARN
AND STABLE; APIARY AND FISH POND;
WORKSHOP AND DAIRY;

AND THE MANY IMPORTANT INTERESTS PERTAINING TO

DOMESTIC ECONOMY AND FAMILY HEALTH.

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INTRODUCTION BY HORACE GREELEY.

TWO HUNDRED ILLUSTRATIONS.

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PREFACE.

THIS is peculiarly a volume for Working Men and Women—a class which, numbered technically, is very large, and in its broader signification includes all Americans. We need not apologize, in this age of books, for adding one to the catalogue; but we may tell the reader, briefly, how this one happened to be undertaken, and how we have been enabled to make it wider in its scope than any industrial work that has preceded it.

During thirty-five years of rambling through the West and Southwest in quest of new materials for a series of biographies of such bold pioneers as Generals GEORGE ROGERS CLARK, KENTON, SEVIER, ROBERTSON, SUMTER; Governor SHELBY; BOONE, BRADY, and their heroic compeers, many valuable unpublished facts pertaining to farm culture and management, domestic economy, and methods of preserving and restoring health, were learned from those whose experience had verified their value. Several manuscript collections of curious statistics, useful recipes and practical experiments having, meantime, fallen into our hands, this work was suggested and begun. Certain of its utility, our efforts, for the past five years, have been directed to a proper arrangement and digestion of the materials, and a completion of them so as to include the very latest discoveries in practical science, the most recent experiments in field-culture, stock-raising, fruit-growing, and subordinate branches of farming, and the last word concerning household management and health in the home circle.

We have striven to make an honest and a useful book, as a contrast to certain ponderous volumes by which our rural people have been defrauded—volumes that are largely filled with turgid paid-for puffs of farming implements. We have omitted most of the Latin equivalents for common names, feeling that, in pages for plain readers, constant interruption by a dead language would tend to confuse rather than enlighten.

In one important particular, we believe this work differs conspicuously from all others. While our relation to it is chiefly editorial, yet in the agricultural chapters we have not only given the approved routine of farm operations, but have endeavored to cumulate experiments, and from their average results draw some approximate solution of those vexing problems of planting and harvesting, breeding and feeding, about which so many have dogmatized. One accurate experiment is worth a thousand theories.

While we have been reasonably minute, we have left many simple operations to the suggestion of the reader. A man who don't know enough to trundle a wheelbarrow, roll a log, or dig a post hole without being told, can never manage a farm. He had better hasten to engage in some other calling.

The index is very full, directing the reader at once to any topic sought; while, still further to increase the ease of reference, we have adopted an alphabetical arrangement in such chapters as are susceptible of it, which will be found a convenient guide to each variety and subdivision.

A cyclopædia like this, necessarily treating of so many subjects upon which hundreds of volumes and thousands of essays have been published, could not be prepared without citing many authorities. While we have not felt obliged to refer to the source of every suggestion, we have aimed to award ample credit to those of whose experiences we have availed ourselves.

Prominent among our creditors stands the Press—especially the agricultural journals of America—a faithful brotherhood of teachers that are doing more for the enlightenment and enduring welfare of this Republic than any other interest or institution, except the common school.

It is pleasant to be able to add that our publishers, who have fully appreciated the demand for such a work from the first, have generously incurred every expense that could render it alike useful and attractive. As a result, it contains more matter, and is more profusely illustrated than any other book for the industrial classes ever published in America.

With these few paragraphs of "preliminary egotism," we submit ourselves to that sturdy usher, the Printing Press, for an introduction. To the thoughtful Plowboy, who meditates as he follows his team, and wonders at the unceasing miracle of vegetable life in the earthy laboratory; to the perplexed Planter, who strives to educe a method from the conflicting theories about cutting seed potatoes, preparing seed corn, drilling wheat, or sowing broadcast; to the skillful Harvester, who studies how to get the most out of his crop this year, and increase it next year; to the thriving Farmer or Villager who thinks of building; to the Stockbreeder, who asks how he may improve his herds, and the Dairyman who inquires if it pays to steam food; to the Gardener, the Fruitgrower, the Vinedresser, the Apiarian, the Sportsman; and last and most earnestly to the Mother of every family who is busy at home, presiding tenderly over all the human interests that center there, we come with cordial greeting, and extend A HELPING HAND.

MADISON, Wisconsin, December 15, 1869.

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FIRST TRUTHS IN AGRICULTURE:

INTRODUCTORY ESSAY.

BY HORACE GREELEY.

Our earth, like the other planets forming our solar system, and probably like those composing other systems, is composed of various substances or elements existing in the form of solids, fluids, and gases, respectively, whereof the proportions are constantly changing. The ancients supposed the elements to be four only—Earth, Air, Fire, and Water—but more modern research has demonstrated that Air and Water are compounds or chemical combinations of certain gases known as Oxygen, Hydrogen, and Nitrogen, respectively. Water is composed of Oxygen and Hydrogen, in the proportion (by weight) of eight of the former to one of the latter. Air is composed of one part (by weight) of Oxygen to a little less than four parts of Nitrogen. But Oxygen combines easily with nearly every metal except Gold and Silver, forming Oxides, and it is thus a principal ingredient, in combination with one or more mineral ores, of most rocks and earths. If this globe could be retorted or dissolved in a chemist's crucible, and thus reduced to its elements, so far as they are cognizable by the science of our day, more than half of its entire weight would be resolved into Oxygen—a gas of which the very existence was first discovered by Dr. PRIESTLEY, less than a century ago.

The learned now substantially agree in the conclusion, that our earth first had a separate, definite existence in a state of heated vapor or gas, which, gradually cooling at the surface, was contracted or condensed, and formed a crust or shell of rock, enclosing and confining the still fiery vapor which formed the bulk of the globe; that this matter frequently burst through its thin shell, causing earthquakes, and forming volcanoes; that such was the origin of what are now quiet and often wooded mountains; the lower chains being first formed, when the crust was comparatively thin; the higher at a more recent period, when that crust had attained far greater strength, enabling it to present greater resistance to internal fires and perturbations, thus rendering eruptions less frequent and more violent; and, when they did occur, throwing up those mighty mountain chains known to us as the Himalayas, the Andes, etc. The volcanic activity still manifested in the earthquakes of South America, the Sandwich Islands, etc., may indicate that these are of more recent formation than the hemisphere known to us as the Old World.

While its crust was much thinner, the earth's surface was naturally much warmer than now, causing a perpetual ascension of vapor, which necessarily returned to the ground again as rain. Observations prove that the sky was more humid, the annual rainfall more copious, and the volume of our streams and rivers far greater, than now. At a later period, cold prevailed, and a rigorous climate was nearly or quite universal, causing

vast glaciers to form and endure for ages on the slopes of hills which have known no permanent ice since the dawn of authentic History. Vast icebergs floated across the seas, then nearly or quite universal, often grounding upon submerged rocks, or scraping and knocking off larger or smaller fragments, and thus triturating or pulverizing them. The soils with which Agriculture now deals are composed of matter which was once gas, next water, afterward rock, and at length, often in combination with oxygen and other gases, became what we now see it. Soil and climate at length favoring, *plants* finally appeared—at first, mainly ferns and mosses, but in time every description of annual, bush, and tree. These, in their processes of growth and vigorous life, absorbed or took up earths, even hastening the decomposition of rocks, and, decaying, restored them to the soil in a finer and more digestible form. This process is still active; and the earth, apart from Man's labors and his devastations, is slowly, steadily becoming more fertile and productive. Its soils are increasing in depth through the decomposition of rocks, and in fertility through the continual growth and decay of plants and trees; but this tendency to melioration is counteracted by the influence of rains, streams, and floods, which annually wash away millions of tons of their best ingredients, to squander them upon the thankless oceans. Fires, also, are sometimes destructive of fertility; while putrid and noisome exhalations waft away valuable elements from the husbandman's fields and gardens to squander them on lakes, mountains, woods, and deserts, where they are of no sensible use to mankind.

Though a little use has been made of Iron, in some concrete forms, by horticulturists, while it is known that several rocks contain potash, sulphur, phosphorus, and other elements of plants, Agriculture has, thus far, learned how to dissolve or convert with profit but two species of rock in aid of production. These are popularly known as Lime and Gypsum or Plaster of Paris,* but are in fact both limestones; the former being a *carbonate* or chemical combination of Lime with Carbonic Acid in the proportion of about five parts of Lime to four of Carbonic Acid; the latter a combination of Lime with Sulphur, in the like proportion. To chemists, the former is known as a *carbonate*, the latter as a *sulphate*, of Lime. The carbonate is made available to farmers by burning the rock to dissolution, which expels the Carbonic Acid, leaving the Lime free. The latter is simply broken and ground, when it is fit for use. It has been held that Lime is only useful as a solvent of vegetable matter; but the fact that it enters largely into the composition of bones, would seem inconsistent with this hypothesis. Gypsum is of use not merely because its elements enter into the composition of animal and vegetable structures, but because its Sulphur is held to have a far greater affinity for Ammonia than for Lime; so that when liberated by grinding and sown over the ground, especially on eminences, or hill-sides, the Ammonia which has been taken up by the breezes that wander at will over barn-yards, pig-pens, decaying carcasses, fetid marshes, drains, etc., eagerly combines with the Sulphur of the Gypsum, forming a Sulphate of Ammonia instead of a Sulphate of Lime, leaving the Lime free. Ammonia is one of the most potent stimulants of plant growth, which explains the seeming disparity between the small quantity of Gypsum applied (usually a bushel to a barrel per acre), and the great results said to be produced.

Though soils appear to respond most unequally to the demands made upon them by Gypsum—those which are located near salt water receiving little or no benefit, and some others responding but feebly—it is probable that no other purchased or commercial manure ever returned, in the average, so large or so prompt a recompense for the cost of

* So called because the city of Paris is built over a bed of this rock, decayed or rotted on its surface, and thus constantly imparting fertility to the soil, even where its surface is a few feet above the Gypsum.

its application as Gypsum. I firmly believe that it has often given *ten for one*—ten dollars in the increased quantity or value of crop for each dollar's worth of Gypsum applied to the soil. Common Lime has often effected great and enduring improvement, but in no such proportion as this.

TREATMENT OF THE SOIL.

The soil or finely pulverized earth, mainly mineral in its origin, is often twenty, fifty, and even in places a hundred feet deep; there are valleys in which it is even deeper. The valley of the Sacramento and the San Joaquin, in California, has been pierced a thousand feet at Stockton, without encountering a suggestion of rock—the strata thus traversed being alternately sand, clay, and vegetable mold. Usually, however, the farmer need concern himself only with that yard in depth of his soil, which lies nearest the surface; and it is to this that my remarks shall henceforth be confined.

Nine-tenths of this soil usually consists of decomposed rock, distinguished as sand, clay, or loam, which last is mainly a mixture of clay and sand. Sand, when nearly pure, was deposited by running or flowing water, by currents. Clay is rock decomposed or deposited in still water, as Limestone was. Neither sand nor clay is often found entirely free from the presence of the other. To these are added the products of vegetable decomposition or decay, which seldom amount to three inches in depth of the surface; though the prairies of the West, the bogs and swamps of the East, are often mainly vegetable to a depth of several feet. These are among the richest soils on earth, though the bogs, being wet and sour, need sweetening and curing to render them of service to the farmer. Lime, Salt, Wood-ashes, are the alkalis usually employed to this end; Wood-ashes, when abundant, are best; but a combination of Quicklime with Salt (the sweepings of salt-stores or vessels, the refuse of packing-houses), will usually be found cheaper and more attainable.

PRACTICAL TILLAGE.

Let us suppose a young farmer to have recently come into possession of one or two hundred acres of fair land, which he is determined to improve and till to the best advantage; how shall he begin and proceed?

East of the Alleghanies and north of Cape Fear or the Santee, the most obvious difficulty is the general inequality of the surface, constraining petty or *patchy* cultivation. Almost every acre of good natural soil will have a rocky ridge or ledge on one side, a marsh or quagmire on the other; and these will be so interlaced and chequered, that, on a farm of a hundred acres, it will often be difficult to find ten acres together, not broken into by some sort of natural interruption or obstacle to tillage. Hence, were these lands naturally as fertile as the Western prairies (which they are not), it would still be impossible to grow Grain or Vegetables upon them so cheaply or abundantly as they are grown in the West. A heavy expenditure in blasting, digging, and drawing away of stone on the one hand, and in draining marshy, boggy grounds on the other, is the indispensable prerequisite to any extensive grain-growing on the sea-board, save on the broad, rich intervals of the Connecticut, and some other rivers. I will consider, therefore, what should be done by the young farmer on a Western soil.

I. The first admonition I would impress on his mind is, *Be thorough*. Plan to make few fences serve, but have all of these thoroughly good fences—not seminaries for the education of breachy cattle. Begin by fencing off two pasture-lots, not too far from your barns; inclose these in high, strong fences, and never let your cattle pass beyond these and their yard, save on special occasions, when they are allowed to gather the fodder of

a field whence corn has been taken. No farmer can afford to graze his meadows, whether in Spring or Fall; he should not admit cattle among his fruit trees; and he makes a great mistake if he allows them to range and browse his woods, for they will destroy many of the best young trees, leaving the worst to take the ground. I have twenty acres of wood, whence I have rigidly excluded cattle for the last fifteen years, and the forest trees are rapidly changing their character for the better in consequence. There were but few Sugar Maples in those woods when I bought them; now there are many; and White Ash, Tulip, and Hickory, are also coming in, where hungry cattle used to browse them to death, leaving the ground to the Hemlocks, Dogwoods, Red Oaks, etc., which they disdained to eat. I tell you, farmers, that, as you can not afford to grow ungrafted fruit, so you can not afford to grow such forest trees only as your cattle refuse to eat. Better exclude your stock, and improve your forests by planting such trees as you need or fancy.

II. Next, I would have you realize *that good land pays better for fertilizing than poor*. There are some who imagine that, because their land is good, it does not need or will not pay for enriching, which is a great mistake. If your soil contains nine-tenths of the elements required to secure a good, bountiful yield of Wheat, Corn, or Oats, you can better afford to add the remaining tenth than you could to add two, three, four, or five-tenths to a poorer soil. If it now yields a first-rate crop without manuring, it will be less and less able to do so after each crop hereafter grown on it. You may have a large balance in bank, yet if you keep drawing and never deposit you will surely exhaust it; and so the farmer who grows crop after crop on a rich soil, burning or wasting the stalks or straw, and selling the grain, is surely hastening the day when that soil will have ceased to be productive.

III. The farmer is a manufacturer of useful and high-priced staples from elements of far inferior value. He procures what costs him but little, and transforms it into something that is worth and will sell for far more. It is his art to know in what shape he may buy cheapest that which will sell for a much larger price.

His soil is generally valuable in direct proportion to its composite or heterogeneous character. If it be pure sand or pure clay, it is of little worth; whereas, the same area of equally mingled or blended sand and clay would be fruitful and valuable. Thus the Platte, Kansas, and other streams which traverse the Great American Desert, bear therefrom the elements which form the rich, fertile bottoms of the lower Mississippi. To plow often, plow deeply, and turn up the subsoil to air, light, and warmth, are of themselves conducive to fertility; though they may be countervailed and overborne by taking off crop after crop of grain or other seed and adding nothing in return. Deep, thorough, frequent working of the soil, so far as it is cultivated at all, is the basis of all good farming.

IV. As to Fertilizers, Plaster excepted, *the nearest are generally the cheapest*. We send half-way round the globe for Guano, at a cost to the farmer of \$60 (gold) per ton, yet allow materials to run to waste, and poison our waters and atmosphere, which would afford an equal amount of plant-food, at less than half the cost. Every good farmer will make the most of the excretions of his animals to begin with; and to this end he will have a barn or cattle-yard, hollow in the center, and raised on every side (like a saucer), so as to give his animals dry footing in the wettest weather, yet keep the center moist, and prevent any escape of liquids. Into this yard he will cart Muck (if he can get it), Leaves, Weeds (cut green), Stalks, Straw, and every other vegetable substance that he can find no better use for; if these are deficient, he will cart in load after load of Swamp Muck, Leaf Mold, or even Turf or Loam, if he can get nothing better. Muck is worth

drawing a mile if his land is quite poor, but not if he can get prairie soil in abundance at hand. To make a big pile of manure, and have it thoroughly ripe for use when he wants to apply it, is the second step in good farming. If he can not make enough of this, he may buy what are called Commercial Manures—Flour of Bone, Phosphates, Lime, and even Guano; but his cheapest and best fertilizer (after Plaster, if not before even that) will be that made under his own eye, in his own yard. And of this the more he makes, within his means, the richer he will become. Millions of farmers have gone into bankruptcy for want of home-made manure; I never heard of one who was bankrupted by making and using too much of that.

On our Eastern granitic soils, I am satisfied that unleached Wood-ashes are worth thirty to fifty cents per bushel, according to quality; but on a Western prairie, of which the soil is largely composed of ashes, and whose grain is much cheaper, they can not be worth so much; still, no wise man will ever sell any nor will he leave them unused. Even Leached-ashes are worth carting half a mile, and applying to very light, warm soils. I think Shell Lime (unslaked) pays on my place, where it costs twenty-five cents per bushel applied. I doubt that any Lime that can be procured in the West will often pay that price. Yet I advise every one who can get Quicklime for that price, to buy a little, and give it a careful trial; sowing and leaving strips alternately, staking them carefully, and watching the result, not on the first crop only, but on the two or three succeeding. I suspect that there are many sections of the West that it will pay to lime; and, I am sure, that farmers in *this* region, who have made Pork extensively for sale, would have lost money thereon but for the manure that, carefully saved, proved of nearly equal value with the meat. We have barely begun to realize the value of manures. The older, and in some respects better, farmers of China and Japan are therein our masters.

V. But we have even more to learn with respect to the agricultural uses of *Water*. An old and successful farmer, who lives near me, sums up his observations and experience in the maxim that "Water is the cheapest and best fertilizer on earth." Of course, every rule is subject to exceptions; yet I firmly believe our American farmers more faulty in respect to water than elsewhere. After traversing fruitful, bounteous Lombardy—the vast plain which gently slopes from the Austrian Alps down to the Po—and of which the annual-product is fully doubled by water, and having also witnessed the marvelous results of irrigation in Utah, I can not patiently abide the general indifference of our farmers to the subject. I estimate that fully One Million American farmers could dam and turn aside a brook or runnel, so as to irrigate at pleasure from two to ten acres of their several farms, at a cost of \$100 for the first outlay, and \$10 per annum afterward, if they would; and that the average increase of their products, respectively, would not fall below \$100 per annum. This, of course, is but a beginning. Ultimately we must dam larger streams—rivers, even, and irrigate by means of little canals, from ten to a hundred square miles from a single dam. Let the water be drawn off when it is highest and richest, and sent meandering gently among fields of grain, and grass, and vegetables, ready to be let on as their needs shall indicate, and we shall have an instant increase in our present annual product, to the extent of many Millions, with a steady augmentation of the fertility and productiveness of our Agriculture for ages to come. Every acre wisely irrigated one year, will prompt the irrigation of two more acres the next year; and so on, till all our lands that can be flowed, by skillful engineering, at a cost below \$50 per acre, will have been provided with the means of illustrating the marvelous productiveness of the narrow valley of the lower Nile.

VI. Nor shall we stop here. I hold the prairies admirably adapted to Irrigation. Choose the highest points or swells that can be found; dig on each a deep well, and

place a self-regulating windmill over it; dig a basin by its side, and the windmill may take its own time for filling it. If the water be brackish, or hard, or otherwise mineralized, so much the better as a general rule, though there may be exceptions. When the suns of May and June have thoroughly warmed the reservoir, begin to draw it off through shallow ditches, leading along the highest swells or ridges, and let it ooze out from time to time to give moisture to the growing crops during the thirsty heats of July and August. I do not believe there is a prairie county in which Irrigation may not be largely inaugurated at a net profit, at least, of nearly twenty-five per cent. per annum on the total cost.

VII. Good farming vindicates itself by a constant increase of the capacity of the soil. The farm that would scarcely keep a dozen head of cattle when the good farmer first took it in hand, soon amply subsists twenty, and by-and-by forty or fifty. It turns off more produce year after year, but in the shape that least exhausts the soil—in Beef, Pork, or Live Stock, instead of Hay and Grain. Nine-tenths of all that the soil yields is thus returned to it as manure, while the free use of Muck, Gypsum, etc., is continually increasing its product in quantity and value. As a general rule, I hold that no farmer ever enriched himself by a husbandry that impoverished, or even failed to enrich, his farm.

VIII. Certain plants—Clover pre-eminent among them—draw nourishment from the atmosphere and impart fertility to the soil. These are wisely grown by every good farmer; but to one who has not Muck at command they are indispensable. Wherever the soil is deficient in vegetable matter—as I have often found it, even in the West, on the openings or “barrens”—Clover affords the cheapest and readiest corrective. If I were buying land my first inquiry would be, “Will it grow a good stand of Clover?” If it will, it may easily be made to produce Wheat, Corn, or almost anything else; and, though turning under the crop is the shortest way to fertility, it may be mowed or fed off, and the sod turned under, with very good effect. Perhaps taking off one crop and plowing in a second—say in August for Wheat—is the better policy for the Northwest.

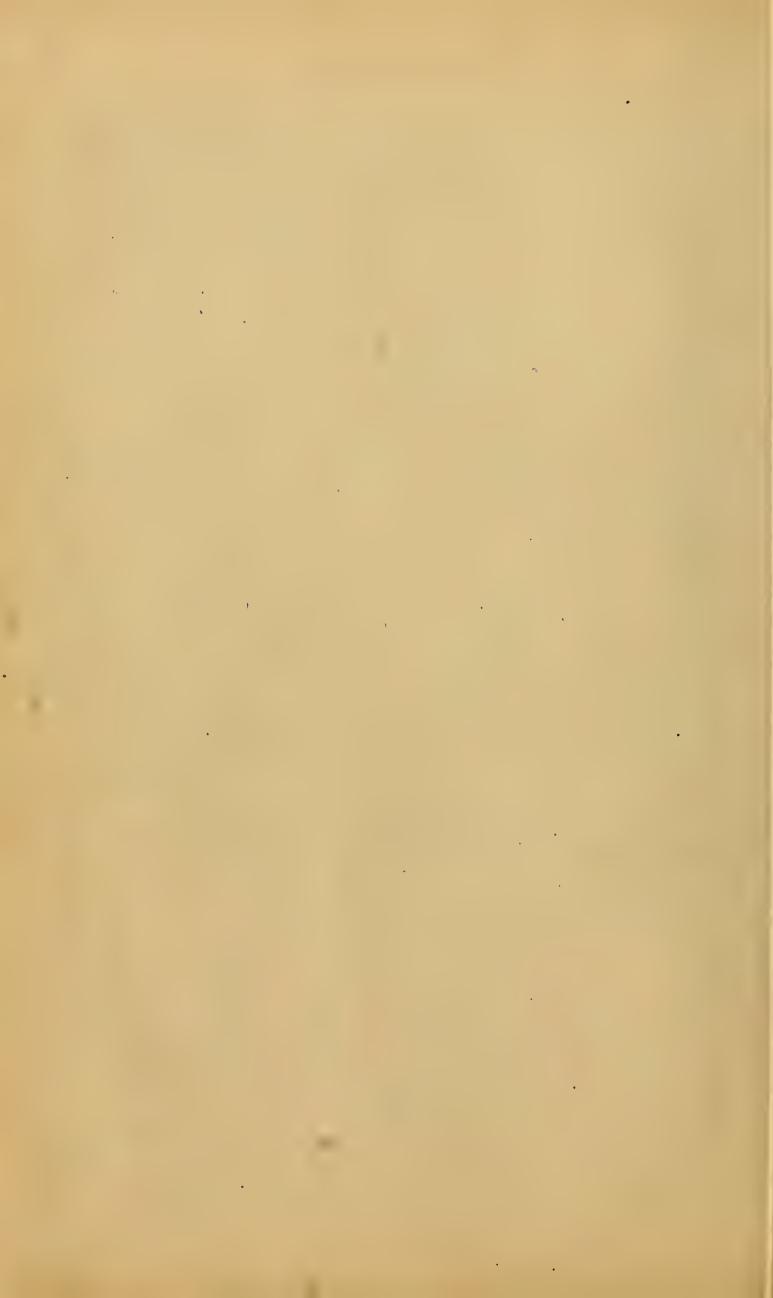
IX. A farmer who grows Wheat, Corn, Oats, Barley, etc., to feed or sell, naturally wishes to make a profit on the labor he employs, and to secure a fair recompense for his own. To this end, he turns a large quantity of earth over and over, with plows and other implements, in order to bring his land into the right condition for seeding, as well as to keep the ground mellow and the weeds down thereafter. Now, it is plain to my mind, that he should seek to achieve the desired result with as small an expenditure of strength as will answer. In other words, if upsetting a thousand tons of earth will subserve his end, he can not afford to reverse and pulverize two or three thousand tons for the purpose; or, more plainly, *large crops must be grown*, in the average, *to greater profit than small crops*. I doubt that any light crop of grain ever paid the fair cost of growing it; while I think few really heavy crops are grown at a loss. Good farming implies good crops, as well as good management in producing them.

X. But, while I would have a given quantity of grain grown with the least displacement of earth that will suffice, I urge the farmer not to seek his economy through a reduction of the *depth* of his plowing. On the contrary, I am sure that our average furrow is quite too shallow, and should be considerably deepened. I know the excuses for shallow plowing—deficient team-power, hurry for seeding, etc., etc; but they are excuses only, not conclusive reasons. Our hot Summer suns and protracted drouths, which seem to increase both in frequency and duration, with the natural, inevitable demands of plants for ample room to strike their roots deeper, and run them farther in quest of nourishment, call urgently for deeper plowing. I have seen a large crop of Cabbage grown in a dry, hot season, from a field well subsoiled, which would not have yielded

half so much if plowed but a single furrow of the ordinary depth. In my judgment, one foot is as little as any land should be plowed; and this depth should be gradually increased by subsoiling so fast as the requisite power can be obtained. I hail with gladness every premonition of the coming Steam Plow, not so much because Steam will pulverize our soils more cheaply than we now attain that end, but because it is sure to do the work more thoroughly, more profoundly. The rich, deep soil of the prairies predicts and demands the Steam Plow; its coming can not be much longer delayed; and when it shall have become as familiar as the Reaper and the Cultivator now are, I am confident that we shall pulverize the soil to a depth of at least two feet, and find that none too much. Then we may defy a drouth of five or six weeks to stop the growth or curl the leaves of our corn; then we may defy the protracted rains often experienced in May and June, to stop our work or keep our young plants for days under water. We shall still employ and profit by Irrigation to increase the luxuriance of our crops; but we shall no longer watch the skies with painful apprehension that five or six weeks of daily, fervid sunshine without rain will blast our hopes of a harvest.

XI. As to Drainage, while I have done my share of it with great profit and satisfaction, I can not hope to commend it to the present favor of Western farmers, who think they can buy land already dry enough, for less than the cost of draining marshy ground. And yet, I would urge that marshes—in fact, any lands surcharged with stagnant water, which leaves it mainly by the slow process of evaporation—are unhealthful; breeding agues and other bilious diseases—that they breed also mosquitoes and other detested insects, and are often unsightly obstacles to symmetrical and economical cultivation. Let any farmer begin by *draining his wettest acre*, from which the requisite fall can be obtained—draining it completely and durably—and I am sure he will not stop with that, but proceed to drain more and more, as means and time shall allow. I have twelve to fifteen acres of natural bog or peat swamp, from which a sufficient outlet is secured with great difficulty, the level being maintained for a full mile below it—yet I have drained it so that I have Corn growing on eight acres of it, and have had good Oats and Grass this season on the residue, where, though surrounded with tillage for two centuries, nothing but weeds and coarse, worthless swamp grass had grown till I took hold of it. I believe this land to day worth all it has cost me, which is twice what a farmer living and working on his own land need have paid to achieve like results.

Farmers who have facilities and opportunity to oversee your own work which I can not command, do better if you can; but, if not, go and do likewise!



AGRICULTURE:

ITS HISTORY, PROGRESS AND PROSPECTS, AND HOW IT MAY BE MADE ATTRACTIVE.

AGRICULTURE may be defined to be the art of cultivating the earth in such a manner as to cause it to produce, in plenty and perfection, those cereals, vegetables, and fruits which are useful to man, and to the animals which he has subjected to his dominion. The word is made to include the preparation of the soil, the planting of seeds, the culture and harvesting of crops, and the breeding, feeding, and management of live stock.

Agriculture preceded manufactures and commerce, and rendered both possible; it is at the basis of all other arts, and was coeval with the dawn of civilization. Systematic husbandry seems to have immediately succeeded the savage state in all races; when population increased, and hunting and fishing became too precarious for a reliable subsistence, man supplied his needs by a tillage of the earth, and the permanent adoption of a pastoral life.

The first mention of agriculture is found in the writings of MOSES. From them we learn that CAIN was a "tiller of the ground," that ABEL sacrificed "the firstlings of his flock," and that NOAH was a husbandman and planted a vineyard. The Chinese, Chaldeans, Egyptians, and Phœnicians evidently held this art in much esteem. The Carthaginians carried it to a higher degree than their cotemporaries, and MAGO, one of their famous generals, wrote twenty-eight volumes on agriculture. HESIOD, XENOPHON, and ARISTOTLE, among the Greeks, and CATO and VIRGIL for the Romans, added their hand-books on the practice of husbandry, and their poetical tributes to its praise.

The early agriculture was of course very rude, and the variety of crops very limited—some simple cereals, and some coarse roots. Fallowing seems to have been a universal practice with the southern nations; but it consisted merely in a suspension of cropping for one year, during which the field was generally over-

run and exhausted by rampant weeds. As man emerged from the condition of a savage, and abandoned the hunter state, the practical work of tillage seems to have been intrusted to captive slaves, while the stronger and more intelligent families, clans, and races were involved in a constant struggle for supremacy, in the brief intervals of which they gave to husbandry a lazy superintendence.

From such farming little progress could be expected to result. The soil was in its virgin fertility. Few weeds offered their obstruction. The ground was scratched, the seed thrown in, and a harvest reaped. Agriculture was everywhere mechanical, nowhere scientific. No considerable improvement could be made as long as the soil, by the simplest processes, supported the population of a country without it.

In Egypt and Rome we find the first traces of the use of manure, in those districts where the population had become dense. It was there that military chieftains came to the plow, drawn thither by the proud thought, as PLINY expressed it, that "the earth took pleasure in being cultivated by the hands of men crowned with laurels and decorated with triumphal honors." In Great Britain, before the Normans came, the need of artificial aids was little felt, and agriculture was little studied.

As late as 1600, Lord BACON showed himself worthy to be impaled upon POPE's epigram, by having his large collection of books upon agriculture piled up in his court-yard and burned. "In all these books I find no *principles*," wrote the vandal, "they can, therefore, be of no use to any man." Yet it may be said in extenuation of the act, that the volumes which composed that *feu de joie* were no doubt crude specimens, for farming was then the coarsest of all crafts, and farmers were ignorant and vulgar boors.

Oats and barley were almost the only vegetables eaten, and the common people had little

meat, except the wild game which the forests afforded. "No hoed crops or edible vegetables were cultivated," says MACAULEY, "and even as late as the reign of HENRY VIII, Queen CATHARINE was obliged to send to Flanders or Holland for salad to supply her table. Neither Indian corn, nor potatoes, nor squashes, nor carrots, nor cabbages, nor turnips were known in England till after the beginning of the sixteenth century. The poor peasants subsisted chiefly upon bread made of barley, ground in a quern, or hand-mill, and baked by themselves. Neither was clover yet cultivated."

For a century before the American revolution England was an exporter of breadstuffs, but after that time she was an importer; and we find the shrewdest Englishmen seeking methods to increase their harvests and their herds. Up to that date the farmers do not seem to have really understood the cause of the productiveness of the soil, nor to have known why persistent cropping caused infertility. But now fens and marshes were drained, wild tracts were subdued, barren lands were irrigated; the character and effect of animal, vegetable, and mineral manures were studied; subsoiling and the rotation of crops began to be practiced! And while many exhausted fields slowly recovered their verdure, an awakened interest was also taken in the breeding of stock—that strong right arm of the successful farmer. Thus agriculture, begun in its simplest form by him who was given a garden and ordered "to dress and to keep it," has come down to us.

Agriculture needs to employ seven-eighths of the inhabitants of every civilized country. Its pursuit tends to give health to the body and vigor to the mind; it is favorable to long life, to virtuous and temperate habits, and to knowledge and purity of character; it should be the best school of personal happiness, as it is the true support of national independence. It had such charms for CINCINNATUS, that under his first mild consulship, the perils that surrounded the Roman republic kept him only sixteen days from the tillage of his little farm.

Is agriculture less attractive now than it was formerly? It can not be denied that *as it has been practiced for the last century* in this country, it has been much less delightful and remunerative than the unagricultural orators and poets would fain have us believe. Farmers and farmers' wives are not enthusiastic in praise of their calling. Although it can be shown that they have accumulated more property than the

average of mechanics, miners, or speculators, many of them feel that they have worked early and late, subdued their rebellious fields by the hardest knocks, and worn themselves out by a life of drudgery. Hoping to profit by the parental experience, the boys rush to the cities, where four merchants in five fail to make a living, and where ten willing men are waiting for every vacancy; and the daughters, remembering the mother's weary face, become school-teachers, store-tenders, or factory girls. By this process, thousands of farms all over the East have passed into the hands of a plodding foreign peasantry, out of the hands of American families tired of hereditary drudgery.

Such a state of things is surely to be deplored. The prosperity and happiness of a nation always depend on the thrift and happiness of its rural people. What is the remedy for this dissatisfaction? The remedy may be said to be complex:

1. *The home must be made more attractive.* Farmers' houses ought to be pleasanter than any other. Standing in the midst of a rural landscape, with no crowding to compel slatternly habits, with plenty of room for flowers, hedges, garden, lawn, all relieved upon a background of summer green, Nature conspires with the thrifty farmer to make his home supremely picturesque and inviting. Yet this condition generally implies a certain degree of culture and refinement in the owner. As long as he is coarse and rude in his tastes, he will not be annoyed by a rickety well-curb, and will be apt to regard a pile of old rails before his front door as ornamental as a climbing porch of roses, or a hedge of *arbor vite*. No wonder that so many boys who have caught glimpses of better things, rush away, disgusted by the repulsive aspect of farm life. How often is it base and mean! the box-like house going to decay; the tumble-down fences; the obtrusive piles of neglected tools, wagon wheels, old iron, and infinite rubbish; the horses half starved and wandering at large, the filthy, bony cows, the squealing pigs, of land-pike variety; the whole dreary waste of fields skinned and plundered from year to year, scarcely any of its product given back in fertility, all its beauty concealed and extinguished! Without any expense, except a little time and taste, our farmers' homes can be embellished and rendered delightful; and only thus can the best youths of this generation be induced to remain in the homestead of their fathers.

2. *Co-operative farming should be encouraged.*

DONALD G. MITCHELL says that being in a street-car in St. Louis, last summer, he fell into conversation with the driver, who said he was on his feet some *seventeen hours a day*, and was paid for it two dollars; that his knees often swelled so that he could hardly stand. MITCHELL asked, "Why don't you give it up, and go to work on a farm? You can get as good wages, and live decently." "Oh!" replied the driver, "I have had enough of that—it's too lonesome; I want to see folks."

Now, the man may be called a fool by some, but he expressed a fact, and one which induces many men, and women, too, to give up a life of comfort, security, and independence on the land, and to crowd into cities, where they can have neither comfort, security, nor independence, and where many of them sink into suffering and disgrace.

What is the remedy for this unfortunate condition of things? It is to make farming more agreeable. How? By enabling men and women to see more of one another, and so to gratify a great social desire, which will tend to make farming not only the most secure and independent life, as it now is, but also the most agreeable.

This is to be done by working in co-operation, and not single-handed and alone.

MITCHELL proposes this way: Let three to five farmers in a neighborhood combine for mutual help, each one owning his own farm, etc., etc. Instead of each man plowing alone, let the whole five combine to work one day for one man, and finish his plowing up; the next day for the next man, and so on, using up the week. Then, with sowing or planting, let the same system be employed, thus using up five days in the week, provided all the days were fair. At any rate, let the system be carried through.

The work will be done faster, with more heart; the young fellows will see one another, they will talk together, and dine together, and get some social interchange, *which they must have*.

The women and younger members of the family must also have some social excitement and pleasure. Let these five families then set aside one afternoon or evening, or both, of each week, when they will all meet at one house, for social entertainment, for eating, for reading, talking, singing, dancing, and so on. Let this evening be sacred to this matter and not be infringed.

We shall then have fewer sickly women and

children, and fewer dissatisfied boys and girls in farmers' houses. Isolation and individualism will not work well. Co-operation will. Let us try it.

3. *Progressive farming must be substituted for routine farming.*—The most intelligent, practical farmers agree in believing that relief lies in breaking up the traditional routine that has passed from generation to generation, and in substituting modern and more rational methods. The farmers who are dissatisfied with their lot, who complain that farming is "to delve all your days and nothin' to show for it," are generally the plodders, who have learned little that is new since their fathers inherited the homestead.

Routine is naturally fatiguing and disgusting to the human mind. Let every farmer resolve to break it up, and substitute science in its place, and we shall hear no more of a farmer's life being a slave's life. Scientific farming does not mean the adoption of fancy theories; it means *a willingness to learn from the laws of nature and the experience of other practical farmers, how to exchange bad habits of husbandry for better ones*.

The art of agriculture, as generally practiced, is to-day behind every other art. Farmers have studied less to perfect themselves in their calling than have the members of any other trade or profession. How many thousands there are, in every State, who never see an agricultural journal or book! Such farmers lack new ideas more than they lack new implements. Their minds need subsoiling more than their grounds!

Routine farming, as it has been and still is widely practiced, is drudgery—one of the most wearying and unprofitable of employments. Scientific farming, as it is to be, and as it has already begun to be—farming based on Nature's laws and the average experience of farmers—is the most pleasant, remunerative, and satisfying occupation of man.* This is the almost uniform testimony of those who have broken out of the ancestral ruts, and have learned a better way.

The time has come when the farmers of the country, even of the Middle and Western States, must do something to arrest the declining fertility of the soil, and the centrifugal tendency of their most intelligent sons. The

*According to the census showings of 1890, the total value of capital invested in lands and implements in this country was \$6,897,900,000, yielding an annual product, in value, of \$2,400,000,000.

hand-to-mouth farming must give way to system. A celebrated painter, being asked what he mixed his colors with, to render them so perfect, replied, "with brains." This is the day of transition between muscle and mind—between brawn and 'brain. Thought is being introduced as a new lever to relieve the elbow.

Inventive genius has strewn over a single county of Ohio more agricultural machinery than could be found in the whole West a few years ago. This wonderful revolution is changing the whole character of farming as an occupation. One intelligent man now can do more than a stupid hundred—more in quality and quantity, and derive from it more of pleasure and profit. The reaper, with binder attachment, whistling through the wheat-field; the mowing-machine and hay-rake; the animated tedder, kicking up its heels in the sun; the prospective rotary plow, that in a few years shall invert our prairies; the adaptable cultivator; the seed-drill; the hay-fork; the stationary horse-power, reaching its right arm to any work—these are the iron-clad missionaries of regeneration, by whose eloquent efforts farming is to become more generally profitable and inviting. Farm machinery is not only labor-saving, but it is, consequently, civilizing; it tends to elevate and refine and lead our people upward in the ways of generous prosperity, because it saves human toil, and thus affords opportunity for more intellectual acquirements.

4. *Farmers must seek to attain a higher mental and social training.*—This is a corollary to the other three propositions. A few of the best educated and cultured men of America are farmers, and their thoughtful sons are gracing the same occupation. But these are a small proportion of the whole. Why is it that a majority of farmers feel that they are inferior, socially and intellectually, to a majority of the merchants of the adjacent city? Simply because it is true. In the long run we are appreciated—cream rises to the surface of the milk. Farmers pass for what they are worth, as precisely as any class or guild.

"The fault, dear BRUTUS, is not in our stars,
But in ourselves, that we are underlings."

As long as the maxim it held through all the rural districts, "the better the scholar the worse the farmer," and as long as it is believed to be folly for a farmer to attempt to learn anything of value to his calling from science or the aggregate experience of his fellows, so long will

the bright boys be selected for "the professions," and the blockheads for the farm.

We must learn that mind governs matter, and that no art or profession demands for its perfect development so much general and special information, and so wide a range of science, as does the art of tilling the soil. To make farming attractive to our boys—the scientific *Why* must be taught. Knowledge must supersede quackery. We must induce one to study, as a specialty, the breeding and care of live stock, in all its departments; another, the growth of crops in the laboratory of the soil; another, the requirements of bee-culture—for there is both pleasure and profit in it; another, book-keeping, so as to keep a constant account with the farm, charging all that it absorbs, and crediting all that it yields (and this every farmer ought to do); another, veterinary surgery—a department deemed worthy of the careful study of German princes; another, to experiment, methodically, with some of those unsettled problems which appear in almost every chapter of this book, and to publish the results. To make the boys contented with the farm, we must give the brain more and the hands less to do.

Another thing: we ought to cultivate better manners—in parlor, kitchen, and field; at the fireside and at the table. Urbanity and rusticity originally meant merely city life and country life; it is not by accident that these words have come to signify politeness and boorishness. Isolation, well-improved, may give vital strength; but we can not acquire polish except through human contact. By lack of this attrition, we, as a class, have come to undervalue the affable manners which mark the gentleman. We do not mean the scraping and bowing, the outward show and studied effect that bespeak the fop; but the ease and grace which come of polite society. Good manners are what Miss SEDGWICK calls the "minor morals;" politeness is "real kindness, kindly expressed." Integrity and benevolence are not a guaranty of politeness; for politeness only comes from intercourse with well-bred people.

To this end, ought we to seek to construct a society about us; to encourage neighborhood gatherings, farmers' clubs, agricultural societies, and every wholesome association that may bring us into contact with others. We can, if we will, learn from our wives also; for they are usually better read and better mannered than we. The morals of American farming communities are higher than those of any other coun-

try in the world, not excepting Scotland; and if we can add somewhat of mental and social culture, the young man may stay upon the ancestral homestead, assured that it is possible to find as much of Eden there, as has been enjoyed since the first farmer was driven out of Paradise.

Progressive agriculture carries a blessing for the future. The progressive farmer builds tasteful and commodious dwellings, with fuel and water convenient, and every auxiliary that can lessen the good wife's toil; he adorns his grounds from time to time with shrubs and flowers; he grafts pippins and greenings on the native stock, sets out new orchards and takes care of old ones; he obtains the handiest tools and houses them; he builds stalls for cattle and raises roots to feed them. He adapts the soil to the needs of vegetable life; if wet, he drains; if clayey and stiff, he applies sand or kindred earth; if light or sterile, he turns under clover and mixes heavier soil; if cold and sour, he gives lime; and he almost always plows deeply and manures liberally.

He teaches his sons not only how to plow, but why to plow; not only how to manure, but what is the effect of different fertilizers; not only what will thrive best on a given soil, but the reason for it; not only how to drain and irrigate, but why—because if they know the Why they can not forget the How. Thus he turns their eyes from their state capital, to their own township, school district, home, and cultivates that local patriotism which is the foundation of the nation's strength. Such farming pays, when conducted with skill, and it will always pay, morally, mentally, and pecuniarily.

And it must be that this progressive farming is to be honored and sought by the most enterprising American youths during the next generation, as during the last generation routine farming has been shunned. There are enough whose taste for rural life and zeal for their profession forbid that this noble occupation shall suffer any decline. Members of the learned professions live chiefly by efforts to abolish the sins, cure the diseases, and allay or regulate the quarrels of their fellow-men; commerce does but exchange staple for staple; manufacturers can only transform one article into another; the agriculturist alone has the infinite satisfaction of "making two blades of grass grow where but one grew before," and of feeling that, by adding something to the aggregate wealth of the world, he is a benefactor of the whole race of man.

"Ten Acres Enough."—Ten acres are far too much for some farmers, and a hundred acres too little for others. In England there are many farmers who more than support themselves and large families on the product of six acres, besides paying heavy rents, and agriculturists in Germany, who are proprietors of five acres, support themselves on two, and lay up money on the product of the remainder.

On the other hand, some farm thousands of acres successfully. The largest farm in the United States is probably that of M. L. SULLIVANT, in Champaign County, Ill., himself a resident of Columbus, O. A correspondent of the *Cincinnati Enquirer* writes: "He owns and presides over seventy thousand acres of the best land on this hemisphere, twenty-three thousand acres of which is under fence, and in actual improvement and cultivation; the balance is used in herding. I will venture the opinion that there can not be found five acres of unserviceable land on Mr. SULLIVANT'S entire seventy thousand acres. Their productiveness is unsurpassed. Almost all of his farming is conducted by labor-saving machinery, so that it is estimated that, throughout, one man will perform the average labor of four or five as conducted on small farms. He drives his posts by horse-power; breaks his ground with Comstock's 'spader,' mows, rakes, loads, unloads, and stacks his hay by horse-power; cultivates his corn by improved machinery; ditches any low ground by machinery; sows and plants by machinery, so that all his laborers can ride and perform their tasks as easy as riding in a buggy."

This is, perhaps, the gentleman who showed to TROLLOPE, in 1861, ten thousand acres of corn growing in one "lot."

Many of the farms of Spain inclose ten thousand acres each, and the great estancia of Senor Don JOSE DE URQUIZA, in Buenos Ayres, covers nine hundred square miles, giving him the largest farm and the most varied collection of fruits and flowers in the world, and twenty thousand soldiers in his personal retinue. Any farmer will err who attempts to deduce general conclusions from the success of either the largest or the smallest farm.

The fact is, that farm is just large enough, where the most can be produced at the smallest expense and with the least exhaustion to the soil. Within a radius of twenty miles of the chief cities, farms are being rapidly subdivided into gardens, and a few acres there, under thorough tillage, and high prices for the crops, will pro-

duce more than ten times the same area at a distance from market. But in America, nine-tenths of the land for the next century must be devoted to grain and stock, and these require room.

There is little danger that the eligible lands will all be overrun, during this century or the next. In England, there are sixty-two persons to every hundred acres; in the United States, but one person to sixty-five acres, or ten to a square mile.* Only one-sixth of the whole area is inclosed in farms, and only one-thirteenth is actually under cultivation. In 1850, there were 113,032,614 acres under the plow; in 1860, this was increased to 162,649,848 acres.† At the same increase per year, it will be more than three hundred years before the 1,700,000,000 acres of unimproved land will be occupied, supposing it all to be arable. But it should really take much less time than this, for the ratio of annual settlement will increase with the growth of population.

Farmers will do well to remember that the average fertility of our occupied farms is rapidly diminishing in all the settled States, whereas it ought to increase with the increasing demand for food. The progressive decadence of nearly all the lands brought under cultivation from the Aroostook to the Mississippi, arises, obviously enough, from the systematic scourging of the soil with crop after crop, without rest or renovation. Hon. JUSTIN S. MORRILL, of Vermont, the projector of the Agricultural College scheme, said in his speech in explanation of that measure :

"Many foreign States support a population vastly larger per square mile than we maintain, and hold their annual increase; put, by the system of husbandry generally pursued here, the land is held only until it is robbed of its virtue, skimmed of its cream, and then the owner, selling his wasted fields to some skinflint neighbor, flies to fresh fields with the foul purpose to repeat the same spoliation. This annual exodus which prevails over all the older States, and even begins upon the first settlements of the new States before their remoter borders have lost sight of the savage, painfully indicates that we have reached the maximum of population our land will support in the pres-

ent state of our agricultural economy. Our skill must be further developed or here is our limit. * * * Shall we not prove unworthy of our patrimony, if we run over the whole before we can learn how to manage a part?

"Our population is rapidly increasing, and brings annually increased demands for bread and clothing. If we can barely meet this demand while we have fresh soils to appropriate, we shall early reach the point of our decline and fall. The nation which tills the soil so as to leave it worse than it found it, is doomed to decay and degradation. Other nations lead us, not in the invention and handling of improved implements, but in nearly all the practical sciences which can be brought to aid the management and results of agricultural labor. We owe it to ourselves not to become a weak competitor in the most important field where we are to meet the world as rivals. It touches us in tenderest points—our national honor, as well as our private pockets. * * * Able to be independent, in a broader sense than any other people, having an area ninety-five times as large as England—yet over one hundred millions of our imports of the last fiscal year, were products of the soil.

"Should no effort be made to arrest the deterioration and spoliation of the soil of America, while all Europe is wisely striving to teach her agriculturists the best means of hoarding up capital in the lands on that side of the Atlantic, it is easy to see that we are doomed to be dwarfed in national importance; and not many years can pass away before our ships will be laden with grain—not on their outward but homeward voyage. Then, with cheap bread no longer peculiar to America, our free institutions may be thought too dear by those of whom empires are not worthy—the men with hearts, hands, and brains, vainly looking to our shores for life, liberty, and the pursuit of happiness."

These are words of soberness and wisdom which those farmers who are nomadic in their tendencies would do well to ponder. Of course, Mr. MORRILL does not mean to recommend the general adoption of a European standard of cultivation in this country, where land is comparatively cheap and labor dear, but he may well admonish farmers that there is such a thing as farming too much by the bushel and too little by the acre.

The average size of farms in the United States is probably twice as great as the reader would suppose, being in 1860, one hundred

* Census of 1860.

† The proportion of nominally improved land in the different sections of the country is as follows: in New England, twenty-six acres in one hundred; in the South, sixteen acres in one hundred; in the North-West, twelve in one hundred; in the South-West, five in one hundred.

and ninety-nine acres to each farm. The average in Massachusetts is the smallest, being ninety-four acres; Connecticut averages ninety-nine acres; New York, one hundred and six; Ohio, one hundred and fourteen; South Carolina, four hundred and eighty-eight; Louisiana, five hundred and thirty-six; Texas, five hundred and ninety-one, and California, six hundred and sixty-six. The average through all the Southern States before the civil war of 1860-1865, was three hundred and twenty acres; now probably somewhat less. But throughout the nation, *farms are profitable in an inverse ratio to their size.* The greed for land has become a national vice, supplanting true economy and overshadowing the pride of culture.

Wanted—Accurate Experiments.

In the preparation of this treatise, we have availed ourselves, as far as possible, of the average experience of the most intelligent farmers; but many highly important problems concerning crop-culture and farm and domestic economy remain unsolved. Enlightened agriculturists in England, France, and Germany multiply experiments on these unsettled questions year by year, and thus, little by little, they ascertain the facts they seek; but we Americans, enterprising in matters of immediate personal concern, are laggards in this method of serving ourselves while we serve the commonwealth.

There are twenty valuable European experiments, published, reduced to an average and systematically brought to bear for the public advantage, where there is one in this country. But European results furnish no reliable guide to our different systems of labor and tillage. None but our own feet can find the way here.

Every respectable farmer ought to try a number of experiments every year; and try them *accurately*, weighing, measuring, and estimating the price of everything. The unsolved problems are countless; many prominent ones are indicated in these pages. It is not necessary to disprove superstitions. It probably matters little which side of a transplanted tree is to the north; which shoulder we see the moon over; or where "the sign" is when we plant beans, or make pickles, or wean a calf or a baby.

But the most careful inquiry may be profitably directed to the best method of selecting seed corn; to the relative effect of planting the kernels from the bulbs and tips; to the expediency of artificial fertilization of seed; to the conditions of top-dressing with manure, and the use of special manures; to the question

when to plant deep or shallow, and at what depth, under given circumstances; when to cut grass of different varieties and for different uses; whether to cure much or little; whether to cut seed potatoes, and if so, how small; the cause and remedy of rot; the best methods of feeding for the dairy and the shambles; the profitableness of steaming food for stock; and the hundred obscure hypotheses and suggestions in regard to fruit-growing, draining, fencing, building, and the vital questions of health and the domestic life.

There are conflicting theories on each of these questions; and they can not be certainly and definitely settled until experiments shall be numerous enough to enable the inquirer to strike a reliable average. It would seem that the desired knowledge might soon be attained, if experiments were made systematically—that is, if the best farmers of a county, State, or number of States could agree to act in concert in testing certain specified matters, and in settling certain disputed points in one department one year, and in another department the next year. Local Agricultural Societies may profitably give direction to these experiments.

Theory and practice assist each other. If philosophy leads to practical experiment, it is practical experiment that leads to truth, directs the steps of the blind, and builds up our knowledge of common things. If Science is the eye of Agriculture, Experience is its right hand, and neither can get along without the other, in ascertaining the mysteries of that hidden alchemy that is the handmaid of progress, in transmuting the common soil, and the barnyard's gathered filth to gold.

How to make Farming Profitable.

—As a rule, every beginner in farming who observes the following rules will succeed; as a rule, those who violate them will fail:

1. Buy no land that you have not capital to pay for—except mature wood land convenient to market.
2. Reserve one-third of your capital to stock, fertilize, and carry on the farm.
3. Provide good fences and gates where they are required; so that your crops shall not be lost by the depredations of intruding animals.
4. Furnish good farm buildings, to secure properly the crops, and to afford shelter to animals.
5. Select the best animals and the best implements that can be purchased at a reasonable price.

6. Bring the soil into good condition by manuring and draining, and keep it so by a judicious rotation, as set forth in these pages. To raise good crops is often the best way to raise a mortgage.

7. Lay out the fields in the best order, and systematically arrange your work.

8. Employ diligence, energy, and careful management.

9. Remember that *the best tilled acre on each of our farms pays the best interest*; that a man on a good farm, even if a small one, gets a good living, while a man on a poor one, whether large or small, is as poor as the farm, and always will be.

SOILS:

THEIR CONSTITUENT PROPERTIES, AND HOW TO IMPROVE AND ADAPT THEM.

It is generally believed that the surface soil, which the farmer cultivates, is mostly composed of the detritus or pulverization of certain rocks, formerly lying immediately under it. But Science tells us that the soil had chiefly a glacier origin. AGASSIZ says: "There has been at work a grinding machine more powerful than the action of the sun, of water, of frost, or of wearing currents. It is the agency of ice; and to that agency we owe not only the grinding of the rocks to powder, and all the comminuted material which forms the chief portion of the loose coatings above the rocks, which serve as the basis for our agricultural operations, but we owe also to that natural machinery the mixture of rocks derived from different regions, which have formed the compound coating over the whole surface of the earth, without which agriculture would be limited to those regions the rocky foundation of which is such as to afford a suitable soil. The agency of ice has been such as to bring together from remote countries the loose materials from the limestone rocks, the slaty rocks, the marl beds, the granite rocks, and the wearing of those materials into paste has transformed them into that coating which really constitutes the bulk of our agricultural soil.

thickness; and yet geology can show that it was so. It would probably excite doubt if it were stated that the whole sheet, moving from the north in a southerly direction, has ground the loose materials resting upon the surface of the earth to that paste which constitutes the agricultural basis; and yet it is so.

"I visited in 1840 the British Isles, and discovered traces of the glacier in Scotland, in England, and in Ireland, and satisfied myself that that country at one time had been entirely under ice. Similar observations were made by other investigators; and, in consequence of all these observations, the conviction gradually prevailed among geologists that Europe had at one time a much colder climate than now, and that the boulders of Scandinavian origin which were found in Northern Germany, had been transported from Norway and Sweden across the Baltic, by masses of ice extending from the North Pole across these regions to the more temperate portions of Europe; and gradually the evidence has been obtained that an ice period once prevailed upon the surface of the globe, during which the continent of Europe was all under ice."

Four earths, thus originating, are the chief constituents of all soils; viz.: Silica (flint, or sand, from granite or sandstone), alumina (clay, from slate or granite), lime (from limestone), and magnesia. These are composed of different metals, uniting with oxygen. Soils are generally classified as clayey, clayey loam,

"It would probably excite a smile if I were to begin by saying that the whole extent of the United States has at one time been covered with a sheet of ice many thousand feet in

loam, sandy loam, and sandy. Other inorganic substances are usually present, such as lime, potash, magnesia, oxide of iron, etc., but clay and sand constitute the bulk of the matter, and the proportion in which they are mixed determines the character of soils.

It is very rare to find either pure clay or pure sand near the surface, but a minimum per cent. of each has been established, below which the ingredient is dropped from the account in the classification of soils. The classification runs thus:

Clayey soil has	5 to 15 per cent.	sand.
Clayey loam	15 to 30	" "
Loam	30 to 60	" "
Sandy loam	60 to 90	" "
Sand	90 or more	" "

Organic matter, called humus, is also present in every soil, and is the product of the decomposition of vegetable matter. It feeds plants with the small amount of nitrogen they require; it is consumed by vegetation, and is reproduced whenever vegetable matter decays in the ground. Its restoration is the chief object sought, in adding periodically a supply of rich manure to land.

The proportion of organic matter (humus) in soils which are naturally productive of any useful crops, varies from one-half of one per cent. to seventy per cent. of their whole weight. With less than the former proportion they will scarcely support vegetation; with more than the latter, they require much admixture before they can be brought into profitable cultivation. It is only in boggy and peaty soils that the latter large proportion is ever found—in the best soils the organic matter does not average five per cent., and rarely exceeds ten or twelve. Oats and rye will grow upon land containing only one or one and a half per cent.; barley where two or three per cent. are present, but good wheat and Indian corn soils contain in general from four to eight per cent., and, if very stiff and clayey, from ten to twelve per cent. may occasionally be detected. Though a certain proportion of organic matter is always found in a soil distinguished for its fertility, yet the presence of such substances is not alone sufficient to impart fertility to the land.

THAYER, in his work on Rational Husbandry, has given a table in which sixteen different soils analyzed by him are classed according to their comparative fertility, which is expressed in numbers, one hundred being the most fertile. This table is the result of very patient investigation, the natural fertility of each soil

being ascertained by its average produce with common tillage and manuring. It is as follows:

No.	Clay.	Sand.	Per cent. of Lime.	Humus.	Private Value.	Common Value.
1	74	10	4	11½	100	
2	81	6	4	8½	98	
3	79	10	4	6½	96	
4	40	22	36	4	90	
5	14	49	10	27	..	
6	20	67	3	10	78	
7	58	36	6	4	77	
8	56	30	12	22	75	
9	60	38	2	22	70	
10	43	50	6	22	65	
11	68	30	3	22	60	
12	38	60	6	60	50	
13	33	65	5	50	40	
14	28	70	2	22	30	
15	23½	75	1½	30	20	
16	18½	80	1½	20	20	

Rich alluvial soils.

The value of this could not be fixed, as it was grass land; perhaps bog-earth.

Good wheat and corn lands.

Barley or oat land; not fit for wheat.

Poor sand, fit only for oats or buckwheat.

Dr. JOHN L. BLAKE, formerly of Orange, New Jersey, sent to Dr. THOMAS ANTISELL, an analytic chemist of New York city, two samples of soil from a field, with the following directions: "After analyzing those soils, I wish you to inform me in what chemical constituents the land is deficient, and what manures or fertilizers, with the quantity of each per acre, will render it suitable for Indian corn, oats, wheat, or clover." The following is a copy of Dr. ANTISELL's analysis, with recommendations:

ANALYSIS.	Surface soil.	Subsoil.
Organic vegetable matter.....	4.56	0.83
Fine sand and silicates of lime and iron.....	85.20	86.00
Alumina.....	2.27	3.20
Per-oxide of iron.....	0.26	0.43
Oxide of manganese.....	.....	0.06
Lime.....	0.44	0.80
Magnesia.....	0.21	0.45
Potassa.....	0.01	0.04
Soda.....	0.63	0.06
Chlorine.....	0.04	0.08
Sulphuric acid.....	0.11	0.05
Phosphoric acid.....	.....	Trace.
Carbonic acid.....	0.06	.....
Loss.....	0.01	.....
Moisture.....	5.70	4.00
	100.00	100.00

"The amount of organic vegetable matter in the soil is in moderate quantity, not sufficient for grain crops. It is in great part composed of undecomposed roots, and, when separated, leaves a very small portion of vegetable matter in a rotted condition, fit for the immediate use of plants. It therefore requires that more vegetable matter should be added.

"The quantity of lime is much too small, either for the crops to be raised, or for acting upon the rootlets not yet decomposed into mould. Thirty bushels of caustic lime will bring the amount of that substance in an acre

of ground three inches deep, over one per cent. This will be the smallest quantity that should be added, and it will need repeating for every crop of wheat. It would then, perhaps, be better to add it in the compost form. In any case, it must be added previous to, and independent of, the following manures. There is sufficient sulphuric acid present in the soil as soluble sulphates, to supply the wants of the rotation.

"The soil contains much too small a quantity of the alkalies, potash and soda, but only a trace of phosphoric acid. These, also, will require to be added. Contrasting the subsoil with the surface soil, we find the former to contain an increased amount of those substances, excepting the sulphates; and thence, it is capable of adding these mineral matters to the surface soil. Whether the crops will obtain what they require from the subsoil, will depend, however, upon the facility of the roots to penetrate the earth, and upon the flow of water through the subsoil, to bring into solution these matters. As these contingencies can not be depended on, it would be unsafe to trust to this source alone, or in great part.

"The rotation, consisting of Indian corn, oats, wheat, and clover, will require, besides other substances not necessary to be added, such as silica, alumina, and oxide of iron, large amounts of alkalies and earths. If we suppose a crop of sixty-eight bushels to be raised—fifty bushels of oats, twenty-five bushels of wheat, and two tons of clover per acre, there will be removed off the soil by these four crops, the following weight in pounds of these important mineral substances:

	Pounds.
Potash	100.55
Soda	29.00
Lime	104.60
Magnesia	33.00
Sulphuric acid	54.65
Phosphoric acid	36.63
Chlorine	8.10
	366.33

"The corn draws the largest portion of this amount, being equal to one hundred and forty pounds, composed of sulphuric and phosphoric acids, lime, and potash. Therefore, it would require per acre of

	Pounds.
Unleached wood ashes	200
Common salt	20
Gypsum	60
Bone dust	120
	400

"This should be incorporated with seven cu-

bic yards of farm-yard manure. One hundred pounds of guano might be substituted for the bone dust with advantage.

"For the wheat and oats, the following substances might be added in a compost, per acre:

	Pounds.
Wood ashes	100
Nitrate of soda	50
Crude Epsom salts	40
	190

"This will supply the deficiency for both crops, having in view the residual matters left in the soil which the corn had not removed.

"The most efficient manure for clover, scattered broadcast, per acre, would be of

	Pounds.
Gypsum	150
Crude sulphate of soda	75
	225

The methods of scientific analysis are too complicated and tedious for the use of the practical farmer, who may be desirous of speedily comparing different soils. The following is given as an approximate test in the Prize Essay of Rev. W. L. RHAM, before the Royal English Agricultural Society: "Take a glass tube, three-quarters of an inch in internal diameter, and three feet long; fit a cork into one end, and set it upright; fill it half-full of pure water; take nearly as much water as has been poured into the tube, and mix with it the portion of soil which is to be examined, in quantity not more than will occupy six inches of the tube; pour the mixture rapidly into the tube, and let it stand in a corner of a room, or supported upright in any way. In half an hour it may be examined. The earths will have been deposited according to the size and specific gravity of their particles. The portion still suspended in the water may be allowed to settle; and there will appear in the tube layers of sand, clay, and humus, which may be measured by a scale, and thus the proportions nearly ascertained. When a farmer is about to purchase a farm, of which the quality is not well known to him, he may be much assisted in his judgment by this simpler experiment, if he has no time or opportunity for a more accurate analysis."

Dr. P. A. CHADBOURNE, President of the Wisconsin University and formerly President of the Massachusetts Agricultural College, gives the following simple process, whereby any person can determine the proportions of sand and clay in a given specimen of soil: "Take any convenient quantity of soil, dry it thoroughly

and then weigh it and note the weight. Then put it in water and boil it an hour or two, and when cool, pour all into a tall, narrow glass receiver, a large vial will do (being careful to have no more than will fill it, water included) and shake it well together. In two or three minutes the sand will be settled to the bottom and the clay, or a portion of it, will remain suspended in the water. Pour this off carefully nearly down to the sand and add clean water, shake it up again and when the sand has settled, pour off, and repeat this operation till what remains will no longer cloud the water. Then pour out the sand upon a piece of paper, dry it, weigh it, and compare it with the gross weight, and you have the proportion of the two ingredients."

A few experiments of this kind, with familiar soils, will enable one to judge by the eye and touch, of the character of any soil with sufficient accuracy to assign it to its proper class. This would be an accomplishment to any farmer, and is one that may easily be acquired.

Earth, true to her motherly relation, transmits her qualities in a remarkable manner to vegetation. All the four varieties of soil—lime, clay, sand, and magnesia—are indispensable as the food of plants. Of these, lime, as a carbonate, acetate, or sulphate, is far the largest ingredient. "The salsola soda," says Dr. THOMSON, "is the only plant in which we know it does not exist." It was found in the ashes remaining after the combustion of oak wood, at the rate of 32 per cent., by M. SAUSSURE. In that of the poplar at the rate of 27 per cent. He discovered also 8 per cent. in those from the wood of the hazel; 56 in those of the mulberry wood; 26 in the hornbeam; 14 in the ripe plant of peas; 1 per cent. in the straw of the wheat, but not any in its seeds; 12 in the chaff of barley, but none in either its flour or its bran; neither did he find any in the oat plant; but then, in the ashes of the leaves of the fir (*Pinus abies*), raised on a limestone hill, he found 43.5 per cent.

The presence of sand is almost equally general. In the Dutch rush it is so plentiful that that plant is used by the turner to polish wood, bone, and even brass. It forms so considerable a portion of the ashes of wheat straw, that when these are exposed to the action of the blow-pipe, it unites with the potash found also in the straw, and forms an opaque glass. Sir H. DAVY found it most copiously in the epidermis or outer bark of the plants he examined.

Magnesia and alumina exist in smaller quantities.

The proportions of the earths contained in the commonly cultivated crops of the farmer have been ascertained by M. SCHREDER. This able chemist obtained from thirty-two ounces of the seeds of wheat, rye, barley, oats, and of rye straw, the following results:

	Wheat.	Rye.	Barley.	Oats.	Rye- STRAW.
Silica.....	13.2	15.6	66.7	141.09	152.0
Carbonate of lime...	12.6	13.4	24.8	51.77	46.2
Carb. of magnesia.....	13.4	14.2	25.3	33.09	28.2
Alumina.....	0.8	1.4	4.2	4.05	3.2
Oxide of manganese.....	5.0	3.2	6.7	8.95	6.8
Oxide of iron.....	2.5	0.9	3.8	4.05	2.4
	47.3	48.7	131.5	247.8	208.8

According to HUXTABLE, an average acre of wheat carries off with it no less than 210 pounds of inorganic elements, namely: 30 pounds in the grain, and 180 pounds in the straw—a striking proof of the importance of consuming the straw upon the land. Barley takes off 213 pounds—53 in the grain, and 160 in the straw. Oats take 316 pounds—32 in the grain, 30 in the husks, 54 in the chaff, and 200 in the straw. A crop of turnips, of twenty tons per acre, when removed off the land, carries off 650 pounds of mineral matter. Potatoes, including the tops, take off 580 pounds, the tops containing about 400 pounds. Cabbage carries off nearly 1,000 pounds.

It will pay the farmer to study these figures. The more intimately he makes himself acquainted with the constitution of his soil and subsoil, of the chemical effects of his manures, and of the needs of his prospective crops, the better qualified he will be to adapt one to the other, and the more likely to reap bountiful harvests.

The natural character of the land indicates what crops should be put thereon, and what manures will most profitably modify it. The relation between the plant and soil is very intimate. Each field will best support a vegetation suited to its own nature; and though this may be counteracted to some extent by the efforts of the agriculturist, yet, on the cessation of these efforts, the vegetation returns to its original type. The love of plants for certain minerals confines them to very narrow limits; and where an alteration of the soil occurs, whereby the mineral is diminished in amount, or removed out of the soil, the plant disappears. This frequently occurs in fields which have been limed; the character of the weeds

is changed, and a new set of plants, which delight in lime, displaces the older growth. The hemp, flax, nettle, and all of the botanical family urticæ, flourish in soils which contain potash; the salicorniæ family, as samphire, glasswort, and saltwort, in soda soils; and the leguminosæ, as clover, beans, and peas, prefer soils which have plaster as a constituent.

If fields of sand, of clay, or of gravel are destitute of organic matter or vegetable mold, the deficiency may be supplied by the application of peat or muck, or vegetable or animal matter of any kind.

Should a given soil prove to be almost destitute of lime (of which it should contain two or three per cent.), and yet to possess the requisite quantity of soluble and insoluble geine—vegetable mold (humus)—about fifty to one hundred bushels of lime to the acre, plowed heavily under, would afford enough of the needed element.

If the deficient ingredient was potash, the same number of bushels of unslaked ashes would, in all probability, furnish the necessary quantity of potash.

Magnesia, if absent from the soil, might be supplied by one hundred pounds of Epsom salts, or by ashes.

If the missing substance should be soda, a few bushels of common salt would supply that deficiency.

If oxide of iron and manganese were wanting, a sufficiency could be found in the ashes spoken of above; or they might both be added by turning up an inch or two of the subsoil, if that happened to be red clay. Should there be sulphate of iron present in the surface soil, or in the subsoil, when plowed up, its sulphuric acid would very speedily combine with the lime applied, form a sulphate of lime, and oxide of iron, and thus provide the former ingredient.

If ammonia be wanted, as it generally is, for the supply is seldom too abundant for fertility, it may be supplied from the barn-yard or the hog-pen, and its quantity greatly increased by the use of the liquid manure from the stable or the barn-yard. This liquid, if mixed with the solid manure and taken to the field before the ammonia escapes, or put in the compost heap with peat or any organized matter, and mixed with sulphate of lime or plaster, so as to fix the ammonia before it escapes in gas, will afford a rich supply.

The phosphates are also present in good soils. Pulverized or ground bones are sometimes used to supply this element. But the

main supply of the phosphates must be the admixture of lime and plaster with products of the stable and barn-yard.

Indeed, if common ashes were applied, most of the important salts and inorganic substances, absolutely necessary, would be thereby furnished. A heavy dressing of barn-yard and stable manure should have the same effect, as in these all those inorganic, as well as organic, substances abound, which go to feed plants and form their structure. If both lime and magnesia should seem to be absent, an application of magnesian lime would be the simplest remedy.

By way of comparison, we append a table from NORTON'S Elements of Scientific Agriculture. The first column gives the elements of a soil fertile without manure; the second, of a poorer one, fertile with manure; and the last column of one known to be very barren. An analysis of one hundred pounds of each soil shows the following result:

	Soil fertile without manure.	Soil fertile with manure.	Very barren.
Organic matter.....	9.7	5.0	4.0
Silica.....	64.8	83.3	77.8
Alumina.....	5.7	5.1	9.1
Lime.....	5.9	1.8	.4
Magnesia.....	.9	.8	.1
Oxide of iron.....	6.1	3.0	8.1
Oxide of manganese.....	.1	.3	.1
Potash.....	.2		
Soda.....	.4		
Chlorine.....	.2		
Sulphuric acid.....	.2	.1	
Phosphoric acid.....	.4	.2	
Carbonic acid.....	4.0	.4	
Loss during the analysis..	1.4		.4
	100.0	100.0	100.0

The substances which are exclusively present in the soil, represented as being fertile without manure, are potash, soda, and chlorine. They are so abundant, indeed, that any attempt to replace them to the same extent in the second variety of soil, would involve an expenditure greatly exceeding the value of the land. They are not, however, necessary to be present to that degree, so far as products for a series of some years are concerned. M. PUVIS has stated that "the thousandth part" of any one of the elements is sufficient to change the nature of a soil, and infuse into it fresh productive powers. The farmer should, therefore, estimate that by giving a good dressing of barn-yard and stable manure, and applying one hundred bushels of ashes per acre, he would not only correct the defects of the soil, but prepare it to go through a rotation, and be in an improved condition at the end of it. In barn-yard and stable manures, and ashes, there will

not only be found the deficient salts, but every other substance that enters into the texture of plants, their flowers, seeds, and fruits.

The third soil described in the table, is more radically defective. It is deficient in potash, soda, chlorine, sulphuric acid, phosphoric acid, and carbonic acid—each and all of which bodies, in a greater or less degree, are absolutely essential to a productive soil—and then, it has an excess of oxide of iron, and a comparatively small quantity of lime and organic matter. Hence, the treatment must be more radical, and more time be devoted to the cure. Two green crops, say of peas, clover, or buckwheat, should be grown and plowed in, as a preliminary process. To prepare the ground to grow these crops advantageously, a compost should be formed of ten loads of stable and barn-yard manure, ten loads of river or marsh mud, or peat, dried, one bushel of plaster, five bushels of pulverized bones, five gallons of oil, and six bushels of refuse salt of the meat or fish packers, per acre. This being formed into a heap, should remain a few weeks, and then be thoroughly shoveled over, so as to be well mixed together. This being spread and plowed in, the land should be top-dressed with fifty bushels of lime and one hundred bushels of ashes, then the peas, clover, or buckwheat should be sown, harrowed in and rolled. So soon as the plant sown comes into bloom, it should be rolled and plowed in, the ground harrowed, a second fifty bushels of lime be sown thereon, and a second crop of the plant selected, be sown, harrowed in and rolled. When this comes into bloom, it should also be plowed in, when the ground should be harrowed, and sowed to wheat. Clover and orchard grass seeds should be sown thereon the ensuing spring, say at the rate of fifteen pounds of clover seed, and two bushels of orchard grass seed, per acre. Such treatment would bring the land described in the third column, up to a profitable state of production.

Besides their division according to texture, already given, soils may be otherwise distinguished:

First. According to their powers of production, when they are termed rich or poor; and

Second. According to their habitual relation with respect to moisture, when they are termed wet or dry.

The power to retain moisture in proper quantities is one of the most important qualities of soil. "The power of the soil to absorb water by cohesive attraction," said Sir HUM-

PHREY DAVY, "depends in a great measure on the state of division of its parts; the more divided they are, the greater is their absorbent power. The different constituent parts of soils likewise appear to act, even by cohesive attraction, with different degrees of energy; thus, vegetable substances seem to be more absorbent than animal substances, animal substances more so than compounds of alumina and silica, and compounds of alumina and silica more absorbent than carbonates of lime and magnesia.

"The stiff clays, approaching to pipe-clay in their nature, which take up the greatest quantity of water when it is poured upon them in a fluid form, are not the soils which absorb most moisture from the atmosphere in dry weather; they cake, and present only a small surface to the air, and the vegetation on them is generally burnt up almost as readily as on sands. The soils that are most efficient in supplying the plant with water by atmospheric absorption are those in which there is a due mixture of sand, finely divided clay and carbonate of lime, with some animal or vegetable matter; and which are so loose and light as to be freely permeable to the atmosphere. With respect to this quality, carbonate of lime and animal and vegetable matter are of great use in soils; they give absorbent power to the soil without giving it tenacity; sand, which also destroys tenacity, on the contrary, gives little absorbent power. I have," he says, "compared the absorbent powers of many soils with respect to atmospheric moisture, and have always found it greatest in the most fertile soils; so that it affords one method of judging of the productiveness of land."

DAVY's experiments and CUTHBERT JOHNSON's are confirmed by those of M. SCHUELER, who varied his observations at intervals of three days and obtained the following results:

KIND OF EARTH.	1600 grains on a surface of 50 square inches, absorbed in			
	12 hours.	24 hours.	48 hours.	72 hours.
	grs	grs	grs	grs
Silicious sand.....	0	0	0	0
Calcareous sand.....	2	3	3	3
Gypsum powder.....	1	1	1	1
Sandy clay.....	21	26	28	28
Loamy clay.....	25	30	34	33
Stiff clay.....	30	36	40	41
Gray pure clay.....	37	42	48	49
Fine lime.....	26	31	35	35
Fine magnesia.....	69	76	80	82
Garden mold.....	33	45	50	52
Arable soil.....	16	22	23	23
Slaty marl.....	24	29	32	32

An experiment designed to show the retentive power of the different soils, resulted in the following manner: In one hundred pounds of dry soil, water will begin to drip, if it is a

Quartz sand when it has absorbed 25 lbs. water.	
Calcareous sand " "	20 "
Loamy soil " "	40 "
English chalk " "	45 "
Clay loam " "	50 "
Pure clay " "	75 "

JOHNSON has extended his examination of absorbent power to various organic fertilizers, with the following result:

	Parts.
1000 parts of horse dung dried in a temperature of 100 degrees, absorbed, by exposure for three hours to air saturated with moisture and of the temperature of 62 degrees.....	115
1000 parts of cow dung, under the same circumstances, absorbed.....	120
1000 parts pig dung.....	120
1000 parts sheep dung.....	81
1000 parts pigeon's dung.....	50

The attractive power of the earth for the oxygen gas of the atmosphere, is also an important element to be considered. Some remarkable experiments were made by Mr. HILL, demonstrative of the great benefits plants derive from oxygen gas being applied to their roots: hyacinths, melons, Indian corn, etc., were the subjects of the experiments. The first were greatly improved in beauty, the second in flavor, the last in size, and all in vigor. This, too, is another use of increasing the moisture of the soil, by deep and complete plowings, for HUMBOLDT and SCHÜBLER have clearly shown that a dry soil is quite incapable of absorbing oxygen gas. "Thus," says Dr. JOHNSON, "it must be evident to the most listless observer, that the more deeply and finely a soil is pulverized, and its earths rendered permeable, the greater will be the absorption by them of both oxygen and

watery vapor from the surrounding atmosphere."

A free access of the air to the soil also adds to its fertility, by promoting the decomposition of the excretory matters of plants and other organic substances of the soil. It also increases its temperature; for earths are bad conductors of heat. The best agriculturists in Europe and America find that ventilation of the roots of plants with the cultivator, is as important as subduing the weeds. Vegetation has lungs; and even the soil can be suffocated. Every farmer knows that when the inert substratum of most cultivated soils is first brought to the surface, it is entirely barren, and that yet, by mere exposure to the atmosphere, it becomes readily productive.

From these experiments of the chemical philosopher, the intelligent farmer can learn many new and important conclusions with regard to the improved cultivation of the earth. From each of the above tables the studious farmer, though he be a plain man, may learn how to increase his harvests. He may learn why fallowing and finely pulverizing promote so obviously and so permanently the fertility of his acres. He may learn how manures act primarily upon his soils, and secondarily upon his crops; how the mixture of sand with clay and muck with sand improves the texture of both; how the roots, like the tops, are exhilarated by the oxygen and nitrogen of the air and quickened by the warm touch of the sunshine; and how deep plowing returns compound interest, by giving the elastic fluids free passage to the dormant earth. Thus he may learn why the new path of science is better than the old path of tradition; and improve his mind by examining more closely the important properties with which the Creator has endowed the soil.

FERTILIZERS:

THEIR QUALITIES, USES, AND COMBINATIONS.

THERE is nothing more generous in reciprocity than the soil; if the farmer feeds it when it is hungry it will feed him when he is hungry. The earth will not be robbed with impunity, but she freely exchanges fruit for fertilization, luxury for refuse. The parable of the barren fig-tree still instructs us; we must "dig about it and dung it," and then we may reap the harvest. Manures, judiciously applied, are the great sources of agricultural wealth. When a successful farmer was asked to what he attributed his success, he answered, "First, manure." "What second?" "*Manure.*" "What third?" "MANURE!" The old Scotch minister, when taken around by his parishioners, in time of drouth, from field to field, to pray for rain and the blessing of Heaven upon the parched and feeble crops, coming to a very poor and neglected field, said to his brethren, "Pass on, pass on; it be no use to pray o'er this field—it needs manure!"

The use of this auxiliary in vegetation was probably not practiced until the soils began to lose their natural power from overcropping. The fabulous king AUGEAS is said to have had a supply on hand, consisting of the accumulated excrement of three thousand oxen for ten years, but he made no wiser use of his treasure than to hire HERCULES to wash it away. It was but just that the spendthrift lost his head.

A manure is any fertilizing compound or ingredient added to a soil in which it is deficient. All cultivated lands should contain the earths, silica, carbonate of lime, alumina, decomposing organic matter, and certain salts, and where one of these is held in too small a quantity for the economy of vegetation, its addition constitutes the great art of manuring.

Manures divide themselves into three classes: 1. The earthy, which are by far the most permanent portions of a soil, and are usually applied in the largest proportions. 2. The organic (vegetable and animal), which are the least

permanent, and are used in much smaller quantities than the earthy; and 3d, the saline, which are the most sparingly applied of all fertilizers, are the most readily absorbed by plants, and whose period of duration in the soil is longer than the organic, but less than the earthy.

To proceed successfully the farmer must know: First, what food constituents his crop will require; second, what is the previous history of the field; third, what is the composition of his manures.

The following classification is condensed from a small pamphlet by Professor J. B. LAWES:

"1. *Plants Cultivated for their Primary Organs*—*Leaf and Stem.*—Manures suitable for meadow grass, clover, cinquefoil, tares, cabbages, and other fodder plants. Substances yielding ammonia rapidly. *Sources.*—Peruvian guano, sulphate and muriate of ammonia; dung from stall-fed cattle, salts of lime, with phosphate of ammonia, soot.

"2. *Plants Cultivated for their Intermediate Organs*—*Bulb or Tuber.*—Manures for turnips and mangel wurtzel. Phosphates, sulphates, and carbon. *Sources.*—Inferior sorts of guano, superphosphate of lime, well-rotted dung.

"3. *Plants Cultivated for their Ultimate Organs*—*Seed.*—Manures for wheat, barley, oats, peas, beans, tares, and clover seed. Organic matter, slowly yielding ammonia. *Sources.*—Residue from highly-manured green crops, rape cake, dung from stall-fed cattle.

"Under class 1, meadow grass should be manured with a substance like Peruvian guano or soot, while the clover should receive, in addition, a salt of lime. In class 2, mangel wurtzel may receive a larger amount of nitrogenized matter than turnips, as it does not readily produce leaves. In class 3, oats and beans are less liable to injury, from too large an amount of manure, than the other crops."

A crop of wheat yielding thirty bushels will

contain, besides water, about 1727 pounds of carbon, 1800 pounds of oxygen, 242 pounds of hydrogen, 49 pounds of nitrogen, and 98 pounds of incombustible matter, containing 11 pounds of lime, $6\frac{1}{2}$ pounds of magnesia, 33 pounds of potash, and 19 pounds of phosphoric acid, and 98 pounds of silica, with small quantities of other substances. Now from what sources does the wheat plant obtain these ingredients? We know that all the carbon (charcoal) was derived from gas (carbonic acid), contained in the atmosphere and soil; that the oxygen and hydrogen were obtained from water; the nitrogen from either ammonia or nitric acid—substances present in both soil and atmosphere; the lime, potash, silica, and other incombustible ingredients we know to be derived from the soil. These plant-foods are the same for all crops; with these in abundance, and suitable conditions of climate, etc., any crop can be grown. Plants have thus the wonderful power of producing such substances as starch, sugar, woody fibre, gluten, from a few simple gases, water, and the ingredients of rocks.

"Looking at the question abstractly," says JOHNSON, "it must be evident, that as animals receive almost the whole of their nutriment, either directly or indirectly, from the vegetable kingdom, their excrement, or their decomposed bodies, returning these to the soil, must form the best manure."

The three best crops for making both feed and manure are corn, clover, and roots, such as the different kinds of field beets and turnips. All these are excellent for the results sought, and should be cultivated on every farm. Where land is cheap and good for corn, as in the Western States, corn will be mainly grown for feed, and manure will not be considered in selecting the crop. But there are many reasons for growing more clover, even at the West. It is cheaper for at least a portion of winter forage, while its fertilizing and renovating effects while growing are needed on thousands of failing wheat fields. The rich nitrogenous manure obtained by feeding clover, if applied to wheat or corn, will largely increase these crops.

From numerous analyses and careful experiments, Professor LAWES estimates the value of the manure made by the consumption of a ton each of many different kinds of feed. "Calculating the clover," he says, "from two cuttings, one and a half tons for the first and one for the second, and one ton for the roots, and adding one-fourth for the straw and stalks of the other crops, I find that one acre of each of the following crops will produce in manure:

Description of Food.	Yield per acre.	Value of manure from a ton of each kind of feed.	Value of manure per acre.
Clover hay.....	3 $\frac{1}{2}$ tons	\$9 64	\$27 71
Meadow hay.....	2 $\frac{1}{2}$ "	6 43	16 07
Corn.....	40 bush.	6 65	9 57
Barley.....	30 "	6 32	5 91
Oats.....	40 "	7 40	5 91
Peas.....	25 "	13 18	12 51
Swedish turnips.....	500 "	91	11 37

According to this table it takes nearly $1\frac{1}{2}$ acres of meadow hay to equal one of clover; nearly 3 acres of corn; nearly 5 of barley and oats; about $2\frac{1}{2}$ acres of peas, and nearly $2\frac{1}{2}$ of turnips, to return the same value in manure as one acre of clover.

We have from the same authority a table showing the comparative value of a ton of manure made from a much greater variety of food given to cattle. It is as follows:

1. Decorticated cotton-seed cake.....\$27 86	13. Indian corn.....\$6 65
2. Rape cake.....21 01	14. Malt.....6 65
3. Linseed cake.....19 72	15. Barley.....6 32
4. Malt dust.....18 21	16. Clover hay.....9 64
5. Lentils.....16 51	17. Meadow hay.....6 43
6. Linseed.....16 65	18. Oat straw.....2 90
7. Tares.....15 75	19. Wheat straw.....2 68
8. Brans.....15 75	20. Barley straw.....2 25
9. Peas.....13 38	21. Potatoes.....1 50
10. Locust beans.....4 81	22. Mangels.....1 07
11. Oats.....7 40	23. Swedish turnips.....91
12. Wheat.....7 08	24. Common turnips.....86
	25. Carrots.....80

X. A. WILLARD, of Utica, New York, visited the farm of Mr. LAWES, in England, in 1866, and on his return furnished to the *Country Gentleman* the following valuable table of results obtained by the scientific farmer of Rothamsted:

MR. LAWES' EXPERIMENTS WITH DIFFERENT KINDS OF MANURE ON PERMANENT MEADOW LAND.

THE PARK.—The land has probably been laid down with grass for some centuries. No fresh seed has been artificially sown within the last thirty years certainly; nor is there record of any having been sown since the grass was first laid down. The experiments commenced in 1856, at which time the character of the herbage appeared uniform over all the plots. [Excepting as explained in the Table, and in the foot notes, the same description of manure has been applied to the plots year after year. (Area under experiment, about $\frac{1}{2}$ acres.)]

PLOTS.	MANURES PER ACRE; ELEVENTH SEASON—1866.	PRODUCE PER ACRE, WEIGHED AS HAY.	
		AVERAGE PER ACRE, 1856-1865.	1865.
		CWTS.	(WTS.
1	200 lbs. Ammonia-salts* (also 14 tons Farm-yard Manure per acre per annum, for 8 years, 1856-1865)	49½ (**)	22½
2	Unmanured, 1st and since (14 tons Farm-yard Manure per acre per annum, for 8 years, 1856-1865)	41½	20½
3	Unmanured, continuously	27½	11½
4	Superphosphate of Lime (†)	27½	11½
4(b)	Superphosphate of Lime, and 400 lbs. "Ammonia-salts"	300½ (††)	26
5	400 lbs. "Ammonia-salts"	20½	13½
(3b)	Superphosphate of Lime, and "Superphosphate of Lime"	29½	17
7	Sulphates of Potash, Soda, and Magnesia(‡); and 400 lbs. "Ammonia-salts"	25½	13½
(18)	Sulphates of Potash, Soda, and Magnesia(‡); and 400 lbs. "Ammonia-salts"	25½	13½
(9)	Sulphates of Potash, Soda, and Magnesia(‡); and 400 lbs. "Ammonia-salts"	25½	13½
(10)	Sulphates of Potash, Soda, and Magnesia(‡); and 400 lbs. "Ammonia-salts"	25½	13½
11a	Sulphate of Potash, Soda, and Magnesia(‡); and 400 lbs. "Ammonia-salts"	25½	13½
12	Unmanured, continuously	66½ (‡‡)	25½
13	Sulphates of Potash, Soda, and Magnesia(‡); and 2,000 lbs. cut Wheat straw	17½	17½
14	Sulphates of Potash, Soda, and Magnesia(‡); and 2,000 lbs. cut Wheat straw	41½	47½
15	Sulphates of Potash, Soda, and Magnesia(‡); and 2,000 lbs. cut Wheat straw	29½	29½
16	Sulphates of Potash, Soda, and Magnesia(‡); and 2,000 lbs. cut Wheat straw	29½	29½
17	Sulphates of Potash, Soda, and Magnesia(‡); and 2,000 lbs. cut Wheat straw	29½	29½
18	Sulphates of Potash, Soda, and Magnesia(‡); and 2,000 lbs. cut Wheat straw	29½	29½
	Mixture, supplying the quantity of Potash, Soda, Lime, Magnesia, Phosphate of Lime, Nitrate of Soda, and Nitrogen contained in one ton of hay (common hay in 1856).	29½	29½

(*) Equal parts Sulphate and Nitrate of Ammonia of Commerce.

(†) 200 lbs. Bone-ash, 50 lbs. Superphosphate of Lime, and 400 lbs. Sulphate of Lime (SP. AT. 172, 600 lbs. Sulphate per acre per annum for 7 years, 1856-1862, but without effect.

(‡) 200 lbs. Sulphate of Potash, 100 lbs. Sulphate of Soda, 100 lbs. Sulphate of Magnesia (Sulphate of Potash also, as on Plots 7, etc., 1856-1861.

(§) 200 lbs. Sulphate of Soda (200 lbs. in 1856 and 1857, and 100 lbs. Sulphate of Magnesia (Sulphate of Potash also, as on Plots 7, etc., 1856-1861.

(||) 800 lbs. in 1856-7-8; only 400 lbs. in 1859-60-61; and 800 lbs. since.

(¶) Average of 2 years only, 1856-1857.

(§§) Average of 4 years only, 1856-1859.

(|||) Average of 5 years only, as three experiments did not commence until 1855.

Mr. WILLARD added: "The different plots of grass are cut to a line, and with the greatest care, so that each may be kept separate. They are kept separate while curing, and each goes upon the scales and is weighed accurately, so that there shall be no mistake or guess-work in the matter. Just before loading upon the cart the sampler goes through the different pieces and selects samples from each to be used in the laboratory. The influence of the different manures has a marked effect upon the quality of the grasses, and it would seem that certain fertilizers have the power of changing the entire character of plants upon a field, forcing out the one to give place to another.

"The grass upon No. 1 (see table page 37), was of very good quality, but rather coarse. No. 2 was finer, with a little clover among it. No. 3 was very fine and of good quality. No. 4 very good quality, and in a more forward state of maturity, (b) coarser than (a), and in both a very little clover. No. 5, plenty of grass—dark color, fine, and no clover. No. 6 like the above. No. 7, some clover, and 8 less than 7. No. 9 had but very little clover, and 10 of similar character. No. 11, very coarse grass and no clover among it. No. 12, grass very fine, with a little clover. No. 13, like 9 and 10; 14, very coarse grass and no clover; 15, very coarse, and 17 finer than 15. No. 18, very good."

Different Soils require different treatment. Clay soils should be treated with lime, ashes, and light composts; such as contain straw and partially decomposed vegetable matters keep such soils light, and furnish by their decomposition the humus in which they are deficient. Black, moist soils, that have been long cultivated, are generally exhausted of the lime and sand needed for grass and grain crops; hence composts containing sand are especially useful on such soils. Lime may be applied freely upon the surface of such soils in the form of plaster, slaked lime, or superphosphate, with advantage. On light, sandy soils, well-worked composts, rendered as fine as possible, and containing a large proportion of muck or other carbonaceous substances, and animal manures of all sorts, are peculiarly appropriate. The influence of animal manures upon sandy soils is well illustrated by the luxuriant growth of corn and melons upon the sands of Cape Cod, by means of fish offal and prepared fish manures, and by the application of white-fish along the coast of Connecticut. Such soils are

hungry for the elements which these manures contain.

Application of Manures.—Ought manure to be applied directly to the surface or be plowed under? This question is still much discussed, and is far from being settled—the best cultivators differing. As to the propriety of top-dressing meadow lands there is little difference of opinion; and many of the oldest and wisest farmers of the country, like JOHN JOHNSTON, of New York State, insist that a top-dressing is best for all crops and all lands.

So much interest has this question excited, that some five years ago the Massachusetts Agricultural Society offered premiums to induce farmers in different parts of the State to try experiments with manure placed at different depths in the soil.* The plan was as follows: Five lots of the same size, on similar soil, side by side, were to be selected, marked, and numbered. On number one the manure was to be plowed in deeply; on number two it was to be plowed in four inches; on number three it was to be spread on the surface and harrowed in; on number four it was to be spread on the surface and not harrowed in; on number five no manure was to be put. The lots were all to be planted and cultivated alike for three years in succession, without the addition of any more manure, and the entire crop of each lot for each year weighed, and an account of the seasons, with description of the soil, was to accompany each report. The reports indicated that the best average results were obtained from placing the manure about four inches deep.

The depth at which manures should be covered will depend upon three circumstances—the nature of the soil, the kind of manure, and the kind of crop. All manures should be placed at a sufficient depth in the soil to keep them moist, or they will be inactive. Manures containing a large proportion of volatile elements should be buried never less than four inches. These elements, when the soil becomes warm, assume the gaseous form, and tend to rise to the surface, and will be diffused through the soil lying over them, and, if there are elements in the soil having an affinity for them, will be retained. Other elements which are not volatile, as lime, ashes, muck, and salt, but which are soluble in water, may be safely

* See Essay by SIMON BROWN and JOSHUA REYNOLDS, M. D., of Massachusetts, in United States Agricultural Report, 1865.

applied on or near the surface, where they will be dissolved by the rain and sink into the soil. Some vegetables strike their roots deeply into the soil, and for their perfect development require a deep tilth. In such instances trenching or deep plowing is peculiarly beneficial. For such crops a portion of the manure should be worked deeply into the soil.

Some haul out manure in the Fall or Winter and leave it in heaps till Spring. This practice is objectionable, because it prevents an unequal distribution, and much of the volatile gases is lost. To leave manure spread broadcast all Winter is almost as bad. Keep it under cover till ready to apply it for the crop.

Air—Ammonia.—It is well known that humus, or upper mold, the most valuable constituent of soils, is formed by the action of the atmosphere on the animal and vegetable matter contained in the earth. The air, however, coming into contact only with the surface of our planet, this fertile substance is generated only to a slight depth. An invention has been introduced into Germany for increasing this agent of fertility, by Herr NONENBRUCH, of the Agricultural College connected with the University of Bonn. It consists in introducing air mechanically to the subsoil, but the method must be simplified before it can be of public utility.

Professor VILLE, in France, has demonstrated that the nitrogen of air is directly assimilated by plants; and also, that ammonia is similarly absorbed from the air. He introduced a quantity of ammonia under a bell-glass, and he says: "From the very first day, the influence of the addition was manifested. The leaves of the plants became tinged with a fresher and brighter green; the stems rose higher, the branches more numerous, and had more leaves; all the plants, however, were not affected to the same degree, the greatest change being observed in the cereals."

Ashes.—Take care of the wood ashes made on your place; don't throw them away or sell them, and don't expose them to the weather. They contain some of the very best fertilizing qualities. Five bushels of ashes, mixed with two double-horse cart-loads of marsh or river muck or peat will convert the whole into good manure. The *Maine Farmer* tells of a farmer who went into the soap-making business some years ago, for the purpose of securing the ashes, after having been leached, to apply to his

land. He made his farm of clayey loam a garden.

W. H. WHITE, of South Windsor, Conn., a thoughtful observer, also testifies to the great value of leached ashes, although in leaching they part with an important fertilizing element. On rich land, wood ashes tend to prevent oats and wheat from lodging, by furnishing silex to strengthen the stem. Hickory ashes are worth fifty cents a bushel on some soils. LEVI BARTLETT says he has seen the effect of ashes upon land "for twenty years after their application." Turf ashes are almost equally valuable.

Cool ashes are by no means worthless. In heavy clay soils, they will, by mechanical action, tend to make the ground porous and easy of tillage. In potato fields they render the soil light and dry, and so favor the healthfulness of the tuber. Thirty, fifty, or even a hundred bushels an acre, on a clayey loam, are not too much. They may be used advantageously as a top-dressing to grass lands; also as a mulch to fruit trees in Summer, and a protection to their roots in Winter.

Bones.—Save the bones as you would save dimes; apply them to your land in the most economical form, as you would reap dollars. The use of bones as manure was begun in England shortly before 1820, and in 1868 fifty thousand tons were imported there. The phosphate of lime can be more easily obtained from bones than from any other common source. They are generally composed of, say, two-fifths fat and gelatine (producing ammonia), two-fifths phosphate of lime, one-tenth moisture, and three per cent. of carbonate of lime.

How to prepare bones for manure. If added in their unprepared state, they will yield annually a small portion of substance to the crops, but a hundred bushels will produce no more effect for a single year, when thus applied, than five bushels when finely broken or pulverized. There are five methods of preparing bones.

1. *Grinding* is an expensive mode. Mills and great outlay are involved.

2. *Burning* is a summary process, but is attended with a loss of fat and albumen, valuable for manure, amounting to about one-third of the whole.

3. *Dissolving* is an expeditious mode, and much practiced. First break the bones with a hammer, then throw them into tubs or casks, containing a fluid which is five or six parts water and one part sulphuric acid (oil of vit-

riol). Let them soak till they become a consistent paste. The water then may be evaporated, and a pure superphosphate is left—one of the most valuable of manures.

4. *Decomposition*: If fresh bones are thrown into compact heaps and mixed with moist, sandy loam and ashes, they will gradually become heated and decomposed. The result will be hastened, by occasionally sprinkling with urine, or mixing with horse manure. The heap should be covered with muck or charcoal to retain the ammonia.

5. *Steaming* has lately been adopted to some extent. This is done by using a strong boiler with a false bottom inside, on which the bones are placed. Water is then added so as partially to cover the bones, and when converted into steam, it completely envelops them, for twenty-four hours, at a pressure of twenty-four pounds to the square inch, when they are reduced to an unresisting mass.

The third or fourth process given will probably be found most practicable for the ordinary farmer. All should beware, however, of swindlers who go about the country puffing and selling the fine sort of calcined bone dust, used up and rejected by sugar refiners, which has been for months repeatedly burnt over and over, until it is perfectly vitrified and worthless.

Farmers ought to be protected from fraud by legislative enactment, providing for an inspector to visit all manufactories of fertilizers within each State, and to declare the whole stock confiscate when adulteration shall be discovered. Cheating in this matter is easy and almost universal, and the knaves can be circumvented only by heroic remedies.

Composting.—"See to it that you increase your dung hill!" said CATO, two thousand years ago. Special manures can be used with great advantage, and adapted to different varieties of soil and crop; but the farmer's main reliance must always be the compost heap—the gatherings from the stable and barnyard. "It is known," says COLMAN'S *Rural World*, "that green manure, or manure fresh from the stables, will not do to apply to crops. This manure must in all cases be changed before it is applied. It must be decomposed—rotted. It is then plant-food, and may be applied directly, either as top-dressing or otherwise."

Fresh manure may be profitably plowed under sometimes, for this mixes it with mold, and is equivalent to compounding in the barn-

yard. But it can not be turned under in Winter, and meanwhile its fertilizing properties must be caught and held. Professor S. W. JOHNSON, of Yale College, pronounces the following opinion of several farmers "a fact," and "one which deserves to be painted in bold letters on every barndoor in Connecticut:" "*That a well made compost of two loads of muck and one of stable manure is equal to three loads of stable manure.*"

ALEXANDER HYDE, of Massachusetts, in a prize essay, says: "We know that it is said by some that the manure is increased in bulk but not in value by this operation of composting; that all the virtue is in the manure, and the more concentrated we can get it the better. As well might it be said that all the virtue is in the flour, and there is no need of composting it into bread. The increased value of the manure is not owing merely to the gases being absorbed, which otherwise would have been dissipated, but by the combined action of heat, air, light, and moisture, chemical changes are produced, and the whole rendered the fit food for vegetation. The muck acts not only as an absorbent, but contains in itself the elements of fertility, and by coming in contact with the putrescent manure, the process of decay in the muck itself is hastened, much in the same way as one rotten apple generates decay among its fellows. This influence of contact, catalytic, as the chemists call it, is wonderful, and furnishes the key for the indefinite increase of the compost heap."

In the management of farm-yard manure three problems require to be considered. First, the production of a manure containing the greatest possible amount of nitrogen; secondly, the successful conversion of that nitrogen into ammonia; and thirdly, the adoption of a method which will prevent the escape of the ammonia.

Manure Cellars.—Most of the natural manures contain valuable elements that are volatile and soluble. If the heap be exposed to the rain and sun the soluble elements will be dissolved and washed out, and the volatile elements evaporated. Experiments of Lord KINNAIRD, in England, proved that housed manures are worth sixty per cent. more than unhoused. "The most convenient arrangement for the protection of manures is the *barn cellar*, and this is coming rapidly into use in the Eastern and Northern States. In every section of the country in which barns are required for the storage of forage and the protection of stock in

Winter, we would recommend the barn cellar as both a convenient and economical arrangement. It should be easy of access and of sufficient height, be built of brick or well-pointed stone walls, and with a bottom impervious to water. It should be protected from currents of air, and if possible secured from frost, so that fermentation and putrefaction may go on through the Winter. Material should be provided and placed in or near the cellar, and be frequently spread over the fresh droppings of the animals, in sufficient quantity to absorb the liquids and to take up the gases as fast as they are formed."² This should be under the stables when practicable. Where this can not be made convenient, the compost heap in the yard should always be sheltered by

A Covered Shed.—Every rain that falls on your manure heap washes away silver dollars. H. M. BAKER, of Virginia, recommends the following shed: "Set a row of forked posts through the cattle-yard, ten feet high, to sustain a range pole. Nine feet distant set another row, eight feet high; and nine feet further another row six feet high; put range poles upon these and cover the whole with old rails or poles, and brush, and upon these put straw, cornstalks, or sedge, to form a roof, which will shed off most of the water and all the sun. Brace the corners well to prevent accidents from high winds, and you will gain twice the cost of the shed every year."

The size of the yard should be proportioned to the amount of stock kept, and its shape similar to a shallow wooden bowl. The barn being furnished with eaves troughs, no more water will be collected in the yard than is necessary for the fermentation of the manure. The yard should be slightly concave, and if possible have a clay bottom, and it ought always to face the south. The drainings should be caught in a covered tank, immediately below the yard, and returned to the top of the heap, from time to time, in dry weather. Punch the heap with a crowbar to admit the liquid, and it will prevent the manure from becoming fire-fanged.

How to make the Compost.—Go to the forest in the fall, and gather with hay-rake and corn-basket ten to a hundred loads of leaves—as many as you have time for—and carry them and spread them in your barn-yard. They furnish the best of beds for horses, cattle, sheep, and hogs; they prevent any loss of liquid or

solid manure; and they become, after decomposition, one of the richest of fertilizers. All such deciduous leaves contain phosphates and other vegetable nutriment, as well as the rich ingredients of humus.

There is also near or on almost every large farm, a pond of water, where leaf mold has lain for years, or a swamp where peat has accumulated for ages. Cart this to the yard* by the dozen loads, for luscious fruits and beautiful flowers, and vegetable food are concealed in the decaying mud. Mix this with the leaves, refuse straw, and excrement from the yard and stable, and you have the key to your next harvest. Throw a little lime or ashes upon the muck (but never on fresh dung, for it will release the ammonia), and build up your heap with alternate layers. Plaster, or a solution of copperas should be sprinkled on whenever it is overhauled.

Of all substances used in composting with animal excrement, perhaps there is none superior to good dry muck; while it absorbs the liquids it deodorizes the manures with which it is mixed, absorbing and retaining the ammonia and other gases, and is ready when applied to the soil to impart them to vegetation. It is this which is mixed with night-soil in the manufacture of poudrette, rendering the night-soil manageable and easy of transportation and application.

"The greater quantity of humus a soil contains, in a state of natural decay," says W. H. WHITE, "the better prepared is it to support vegetation—the greater its capacity to absorb and retain heat and moisture, essentials in the support of plant growth. The great source of this humus of the soil is animal and vegetable substances, and as these substances are unequal in their decay, it is better to mix them; the animal putrefaction proceeding rapidly tends to hasten the vegetable, while the vegetable tends to temper the animal, thus together benefiting each."

Muck and leaves should also be added to the hog-pen occasionally during the Winter, and, unless the hog manure is to be kept for corn or garden, the whole should be added month by month to the compost heap. It should all be worked over fine in early Spring, and rendered dry by adding peat, if necessary.

*It will be still more valuable if taken out and allowed to dry for some weeks or months before being used in the yard. The muck from the pond is better than the peat.

By perseverance and industry in this process, few farmers will need to buy manure. Any farm may thus be made to manufacture all the manure for the crops grown upon it, except potatoes, and those should have plaster or ashes instead of barn-yard manure, as the latter increases their tendency to rot. Millions of dollars are yearly expended that ought to be saved, for with adequate painstaking, a farm whose stock is rightly proportioned to the number of acres tilled, will furnish all the manure necessary to keep the soil constantly increasing in fertility.

The Garden Compost.—In some convenient spot, at a distance back of the house, excavate a basin ten or fifteen feet in diameter. Cast in a few loads of forest leaves, and some dry muck, then arrange so that all the soapy water from the sink and wash-room may be conveyed to it, also the urine made on the premises. Add old shoes, old rags, and every dead animal. Throw in the rakings from the paths, the weeds, fine chip-dirt, and sawdust from the wood pile, leaves, and, in Autumn, the vines from the garden.

The privy should be so constructed as to yield up readily its accumulations, either from a tight box, so hung as to be easily moved, or from a sliding drawer, whence the contents should be conveyed to the heap of absorbent refuse. The addition of swamp muck, dry earth, or a little chloride of lime to the vault now and then, will prevent any offensive odor. Or the dry earth may be added in the privy, and the whole mixed, so as to render the contents more manageable.

The saving of the night-soil of the farm is certainly worthy of receiving more attention, as it forms one of our best and most concentrated fertilizers, rich in all the elements of plant food. Many object to utilizing it from the disagreeableness of the manipulation or prejudice, but would they but adopt some such course as the above, there would be little, if any, more offense in its manipulation than in handling poudrette of commerce, and certainly less objection in the whole than in the single cleaning the vault, where no absorbent or deodorizer has been used.

Now and then a peck of salt may be added to the pile. If the droppings of the poultry-house are not kept for a separate guano, they should be brought and emptied into this garden mine. Overhaul the whole occasionally, and by good management you may have twenty or thirty loads of the very richest fertilizer for

garden and farm. During the Summer, the "mine" may be surrounded by pole-beans, which will yield a treble tribute, hide the deformity, form a pleasant group, and supply the table with wholesome and seasonable vegetables.

Fallowing is a process of fertilization formerly much in vogue. It consists in plowing land and exposing it to the influence of the atmosphere, to render it friable, clear it of weeds, and, sometimes, to give it rest. Unless on the first occupation of an exhausted and dirty farm, and without the means of manuring for fallow crops, the system of an entire Summer fallowing is indefensible. Sir H. DAVY says: "It is scarcely possible to imagine a single instance of a cultivated soil, which can be supposed to remain fallow for a year with advantage to the farmer." An alternation of green crops is better. Half fallowing, and thus loosening the adhesive particles of earth and admitting air, is sometimes very beneficial to clayey soils. Akin to fallowing is

Green Manuring.—Mold, as has been seen, is indispensable to every soil, and a healthy supply can be preserved by turning in succulent green crops in a deficiency of rich composts. This returns to the soil the salts, silicates, and humus which the plant has drawn from it, with the organic matter which it has elaborated from the oxygen and hydrogen, carbon and nitrogen of the air and water. The Flemish people early added green manuring to their otherwise careful husbandry, until their fields averaged to the acre, in 1820, thirty-two bushels of wheat and rye, fifty-two bushels of oats, and three hundred and fifty bushels of potatoes. Clover seems to have been their main reliance.

When green crops are to be employed for enriching a soil, they should be plowed in, if it be possible, when in flower, or at the time the flower is beginning to appear; for it is at this period that they contain the largest quantity of easily soluble substances, and that their leaves are most active in forming nutritive matter.

Red clover, both in its green and dried state, contains a large proportion of lime, magnesia, carbonic acid, and potash, and also considerable quantities of phosphoric and sulphuric acid, chlorine and nitrogen,* and hence its value as a

* Professor JOHNSON analyzed a first crop of clover from

manure. As a plant it has numerous and strong stems, branching upward and sideways from a single seed or root, and broad, succulent, and shady leaves, and long, thick, and strong tap roots. When we consider that it is a very hardy plant, tillers well, covers the ground thickly, displaces weeds, extends its roots more deeply into the soil than any of the grasses, yields largely to the acre, absorbs much and most of its fertilizing gases of carbonic, phosphoric, and sulphuric acid, chlorine, and nitrogen, or ammonia,* from the air, and also grows well on every variety of dry soil, we need not wonder at its great celebrity as a manurial plant in our Northern and Middle States. Its stems, leaves, and roots, when plowed down as a manure, not only render the soil porous, mellow, and permeable to heat, air, and moisture, but also in and by their decay draw the fertilizing saline, and mineral elements of the subsoil up into the surface soil, and so enrich and fit it for the production of all other valuable farm crops, such as wheat, corn, and the like.

It is more popular in America than any other manurial crop. White clover is also grown; too small for the scythe, it forms a most valuable pasturage. Sow plaster, if your soil is suitable, to make the clover grow rank, and do not mow it—plow it all under, and run a subsoiler in every furrow to be sure and break up all the tap-roots. Sow lime or ashes upon the sod to help the work of decomposition. Do this once in three years, and you will manure your fields cheaper than you can by any purchasable fertilizer.

Buckwheat straw contains considerable quantities of lime, magnesia, potash, soda, and phosphoric and sulphuric acid, and hence its value as a green manure. It grows up rapidly on

almost any soil where other plants would starve. It is at once a cleanser and renovator. It blossoms so much earlier than most other plants that two crops of it can, if necessary, be grown and plowed down on the same land the same season, and the ground be seeded with grass or a grain crop in September. Lands too poor to grow clover have been renewed by rye plowed under, and also by oats and corn.

Ripened cornstalks or straw should never be burned, but always be turned under to yield their full fertility. The common pea is a remarkable fertilizer when plowed under. The stalks of bushbeans contain a very large proportion of lime, potash, carbonic acid, and chloride of sodium, and considerable quantities of magnesia, soda, phosphoric and sulphuric acid, and nitrogen, hence where plowed in, after picking the beans by hand, they impart to the soil far more strength than they received from it. The vines of peas are equally valuable. They not only rid the ground of weeds, but leave it in a light and mellow condition for wheat. They succeed best on moist and loamy ground. All such crops may be pastured slightly, and some agricultural writers maintain that sheep are a positive advantage.

GEORGE GEDDES, of Ontario County, New York, said recently, at a meeting of farmers, that though now an old man, and having an excellent farm, which he has kept constantly improving for many years, the chief manures he has used have been *clover, and the sheep's foot*. Other manures were used only to produce the clover.

The wise farmer allows no manure to waste; he composts the droppings of his animals with straw and litter; he makes the swamps and woods contribute to his manure heaps; he keeps his farm up by one year after another enriching different fields, and he sends the longerooted clover to bring up the hidden wealth of the subsoil. With all this he will find it is with the whole farm as it is with the single field—in time it will feel the draft, and the farmer must look beyond the resources of the farm itself to supply what he sends away in his marketable production, whatever they may be. No matter what the farmer sells, he sells the inorganic constituents of his soil. If he would keep his soil improving, or not decreasing in value, he must restore those in some way.

To Feed or Plow Under.—It ought to be constantly remembered that green crops plowed under will fertilize far more than when fed to

an acre of land, and found it to contain the following ingredients:

Albumen, gluten, and casein.....	430 lbs.
Fat, oil, etc.....	113 "
Starch, sugar, gum, and dextrine.....	1,225 "
Fibre and husk.....	1,150 "
	3,554 lbs.

The value of the ashes may be estimated by the following per centage of its several elements:

Potash.....	12.164 3/4 cent.
Sodium.....	2.414 "
Soda.....	20.757 "
Lime.....	16.556 "
Magnesia.....	6.262 "
Phosphate of iron.....	.596 "
Chloride.....	2.153 "
Phosphoric acid.....	2.957 "
Sulphuric acid.....	.891 "
Silica.....	1.368 "
Carbonic acid.....	22.820 "
Sand and coal.....	1.214 "

99.718 3/4 cent.

* JOHN F. WOLFINGER, of Pennsylvania, in U. S. Agricultural Report.

cattle in the barn-yard and subsequently applied in the form of the resulting manure. In all vegetable mold, carbon and the elements of water are important and indispensable elements; and when hay and grass are eaten by farm stock, about sixty per cent. of the elements of mold and manure is converted into gas and vapor to provide animal heat by ceaseless respiration.

* J. B. BOUSSINGAULT, a practical farmer, a man of science, fortune, caution, and integrity, has made experiments that bear directly on this question.* A horse that neither gained nor lost weight, consumed 20 lbs. of hay, 6 lbs. of oats, and 43 of water in 24 hours. The hay and oats contained 10 lbs. 6 oz. carbon; 1 lb. 2 oz. 5 dwt. hydrogen; 8 lbs. 7 oz. 2 dwt. oxygen; and 4 oz. 9 dwt. nitrogen. Of these the dung and urine gave on an average in each 24 hours, carbon 3 lbs. 11 oz. 7 dwt.; hydrogen 6 oz. 2 dwt.; oxygen 3 lbs. 7 oz. 16 dwt.; nitrogen 3 oz. 14 dwt.

It will be seen that ten pounds six ounces of carbon are reduced to less than four pounds; so that over six-tenths are lost to the manure heap and to the mold in the soil. Eight pounds and over seven ounces of organized oxygen are reduced to less than four pounds; and hydrogen in about the same proportion. It is remarkable that while the horse consumed 43 pounds of water as drink, and 3½ lbs. in hay and oats not perfectly dry, he voided in urine only 3 lbs. 6 oz. 15 dwt., and over 25 lbs. in excrement and the balance to make up 66 lbs. and over as insensible perspiration or cutaneous exhalation.

A cow that consumed 12 lbs. 10 oz. 13 dwt. of carbon in her daily food gave only 5 lbs. 3 oz. 7 dwt. in her liquid and solid excrements; with other results similar to those named in feeding the horse. The researches of THOMPSON, LAWES, GILBERT, and several others confirm the general accuracy of those above cited.

How to Plow in the Crop.—When the crop is ready for the plow, it ought to be rolled down, when the morning dew is on, in the direction that the furrows are to run. It should be covered to the depth of five or six inches only, because a greater depth will carry it beyond the immediate influence of sun and air.

Guano.—This article of commerce has been known for ages in Peru, but has been in-

troduced to the United States during the present century. It is composed of the excrement of the sea-birds of the Pacific, which fly above and live upon the rocky islands in flocks of millions. Professor NORTON, of Yale College, gives the composition of a few leading varieties of guano in the following table:

Variety.	Water.	Organic matter and ammoniacal salts.	Phosphates.
Bolivian ..	5 to 7	56 to 64	23 to 29
Peruvian ..	7 to 10	56 to 66	16 to 23
Chilian ..	10 to 13	50 to 56	22 to 30
Ichaboe ...	18 to 26	36 to 44	21 to 29

This, it is evident at a glance, is an extremely rich manure; the quantities of ammonia and of phosphates are remarkably large. According to an analysis by VÖLCKER, one pound of guano was found to be equal to fifty pounds of barn-yard manure. Of this fertilizer the Peruvian government estimates that the Chincha Islands alone contain the enormous quantity of *twenty millions of tons!* This will supply the world, at the present rate, during the next fifty years. The *American Farmer* recommends the use of plaster or charcoal with guano to fix the ammonia; while others advise a mixture with five or six times its weight of dried muck. A series of elaborate experiments with potatoes, by General BEATSON, on St. Helena, resulted as follows:

	lbs.
Guano, or sea-fowl dung at 35 bushels per acre.....	639
Horse dung, 35 cart loads per acre.....	626
Hogs' dung, 35 cart loads per acre	534
Soil simple.....	446

With mangel wurzel, the product per acre was as follows

	Leaves. Tons.	Roots. Tons.
Soil simple.....	38	19½
Hogs' dung and ashes, 360 bushels per acre.....	131	68½
Guano, 35 bushels per acre.....	133¼	77½

Hon. MARSHALL P. WILDER, well known to the country as one of its leading pomologists, applied eight hundred pounds per acre, and harvested from it sixteen hundred bushels of carrots. It is believed, however, that the best use that can be made of guano at seventy dollars a ton, is to give a start to poor or exhausted land. It is best applied in damp or showery weather, and when put on plowed land should be immediately harrowed in.

* A full exposition of this matter will be found in BOUSSINGAULT's *Rural Economy*, published by ORANGE JUDD, New York.

Farmers can not be too cautious how they "certify" to the good qualities of certain guanos. They can not know, accurately, anything about it, being able to judge only from the effect on their own fields. English dealers in fertilizers use only the certificates of well-known chemists, and these are the certificates most to be depended on.

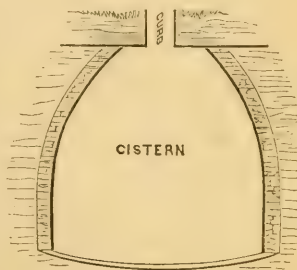
Liquid Manure.—The saving and use of liquid manures are deserving of more attention than they have hitherto received in this country. When cattle are kept in stalls through the Winter, and especially where soiling is practiced, and cows are kept in the stall through the year, the floor should be so arranged as to conduct the urine into troughs beneath it, which will convey it into a reservoir in the cellar or outside the barn. This can be done at very little expense. The accumulated urine may be pumped into a water cart, to which a sprinkler is attached, similar to those used for watering the streets. If it is pumped in through a strainer the sprinkler does not become clogged, and it may be immediately conveyed to the field and distributed as a top-dressing upon grass or grain.

When the soil is not deficient in carbonaceous matter there can probably be no better top-dressing applied. It is not as permanent in its effects as the solid excrements, but more immediate, and may be applied two or three times a year. For raising green crops for soiling it is invaluable. If plaster, or a solution of sulphate of iron be added occasionally to the reservoir, it will act as a deodorizer, while at the same time it adds to the efficacy of the manure. "Each family, of five hundred families in a country town, might save manure to the value of five dollars annually that is now wasted. This would amount to twenty-five hundred dollars, or one dollar for each individual in the town. This would be sufficient to pay the highway tax and build one good school-house, or it would pay the entire school tax of most towns of that number of inhabitants."

Remember that a pound of urine will produce a pound of wheat! The utilization of liquid manures is one of the secrets of the marvelous success of Flemish husbandry, where a hundred acres of arable land will support a hundred head of cattle.

Cisterns for liquid manure should be made of the same material as for rain water, and should be tight and durable. Wood will answer until

it decays, but stone laid in water-lime mortar or cement and plastered with two or three coats, is much better. Where a single reservoir only is required, it may be made as shown in the following illustration, being contracted toward the top like an arch, but with an opening large enough for a man to enter to shovel up sediment when it accumulates. It should be set in an excavation deep enough to admit an earth covering a foot or two thick, in the Northern States, to prevent freezing, and so placed as to receive the liquid portions of the manure from the stables and the drainings of the manure heap, but not surface water. Liquid manure is allowed to stand several weeks before applying, and is diluted with some three times its bulk of water, which may be drawn from the roofs of the buildings.



Lime.—Of all the mineral manures, lime is the most powerful and rapid in its effect as a promoter of vegetation, and as a chemical modifier of the soil in rendering clays more friable. It is an essential ingredient of plants, and abounds in the stalks and grains of all the cereals.* Lime, in any state, applied to the surface of peat soil (and in such case it should be given in large quantities), causes the vegetation of white clover and the finer grasses, where only the coarsest herbage had previously appeared; but as a general rule, especially where it is a costly article, it is most efficaciously applied to fallows, and should be harrowed or lightly plowed in at the conclusion of the course of tillage, as it has a tendency to sink in the soil. It is almost useless to supply it to any land requiring drainage.

*Twenty-five bushels of wheat contain about thirteen pounds of lime; twenty-five bushels of barley contain about ten pounds of lime; fifty bushels of corn contain about twenty-two pounds of lime; two tons of clover contain about seventy-seven pounds of lime.

Lime must be among the manures which promote the permanent fertility of the land, as, unless washed away, it can not escape except by preparing food for the cultivator's crops. It is profitably applied to old pasture leys at the rate of fifty to five hundred bushels per acre; and some of the English moors have appropriated fifteen hundred bushels per acre. It is valuable in proportion to the amount of vegetable mold it has to act on. Indications of want of lime in the soil may be seen in heavy crops of straw, and light crops of grain; and in root crops where they seem to run to fingers and toes.

Lime is applicable to every clay soil, every peaty soil, and every soil in which vegetable fibre does not readily decay, because that is a sign that it contains some antiseptic acid, which prevents decay. This is the case in peat beds and swamps. Sandy, gravelly, or thin soils, may be overlimed and more food must be given for the lime to act upon. No farmer, who knows what the action of lime is, upon all soils, will ever do without it as an accessory to his manure.

The effect of lime is not perceptible in the soil the first season it is applied, and its full influence is seen only after the second or third. Its effect is greatest when kept near the surface. Lime is hardly a direct fertilizer, its office being to absorb ammonia, reduce it to a salt, and yield it up to growing plants, and thus to anticipate the fertilizing properties of vegetable manures that are slow in the process of decomposition.

Muck.—The value of muck, or swamp and pond mud, is not yet understood in this country. If finely pulverized peat be strewn over the floors of stables, piggeries, or cow-houses, with a very slight covering of straw over it, it will absorb and retain all moisture, disinfect the building of every noxious gas injurious to cattle, and by its mixture with the excreta from the animals, form a most valuable and portable manure fit for immediate use. Sheep folded upon it at night would produce wonderful and most important results to farmers in the vast production of valuable manure. Two or three hogs will work up a cubic yard of good muck in two days, if furnished on a good floor, and a sprinkling of corn mixed in for them to find.

This muck is chiefly formed from decayed vegetable matter, the humus of plant-food, and when composted, its value is greatly enhanced. Muck hauled directly from the bed, and dried a few weeks in the sun, will produce excellent

crops on any good sandy loam. This is the stuff to spread in the barn-yard and hen-house in the fall.

Night-Soils.—We return to the manure which has already been treated, to impress again the value of the privy's contents. The compost and the privy are premises of which the harvest is the logical conclusion. "As the body of an adult does not increase in weight, it needs no particular calculation to make out that the collected excrements must contain the ash constituents of the bread, meat, and vegetables and the whole of the nitrogen of the food."⁸ Build your privy square on the ground, without any vault underneath. Fix a board to swing horizontally on the back side. Turn this up occasionally and cast in two or three barrow loads of muck, or dry mold, or plaster, as a deoderizer and retainer of the valuable elements. By such treatment you may deprive this place of frequent resort of any offensiveness, and may draw from underneath, from time to time, the richest poudrette, almost as good as the best guano, free from all commercial adulterations. A majority of the privies in America are a disgrace to humanity.

Every town in the country should adopt measures, without delay, to utilize these deposits. In no city of continental Europe is human ordure allowed to waste, much less, as in some of our cities, to mingle with the water which is to be drawn upon for culinary purposes. At Nice, it sells so high that *every peasant* makes it an article of commerce, and keeps a convenient office for passengers. Night-soil mixed with peat will produce a prodigious yield of corn or potatoes, and, judiciously applied, will double the yield of almost any crop. The farmer living near a city can hardly pay too high a price for it. The increase of crops which American farms could be made to produce by the systematic application of all the night-soil that is now wasted, *would be sufficient to pay the national debt in twenty years!*

Phosphate of Lime.—At a meeting of the Massachusetts Board of Agriculture in December, 1868, WM. S. CLARK President of the State Agricultural College, announced his belief that "the best farming demands commercial fertilizers," and gave an interesting account of the recent discoveries of mines of hidden wealth. We quote:

⁸ LIEBIG'S Natural Laws of Husbandry, p. 259.

"Now I am one of those who believe that the treasures which are necessary for man in his highest development, in his highest degree of civilization, when the earth is populated more densely than it is anywhere to-day—I believe that those treasures are in the earth, and are to be brought forth as gold was in California when wanted, as petroleum was in Pennsylvania when wanted, as they have just discovered in Germany, at Stassfurth, a wonderful deposit, as of the boiling down of an ocean, leaving a mineral deposit which will enrich all the continent—twenty-five miles square and twelve hundred feet thick. At the bottom, the least soluble part, is sulphate of lime; above that, a thousand feet of rock-salt; above that, sulphate of magnesia and sulphate of soda; and above that, a hundred feet, more or less, of the chloride of magnesium, chloride of calcium, and chloride of potassium. Here is a supply of mineral wealth enough to last the whole continent for centuries. I believe that chemistry is to evolve out of that mineral deposit an immense mine of wealth for the agriculture, not only of this country, but of all countries where science is applied to that branch of industry.

"But I rose particularly to call attention to a more wonderful discovery in this country than that at Stassfurth. It was said, years ago, by Professor LIEBIG, that we had a supply of phosphates for only twenty years in all the world; that the guano islands would soon be stripped, and then where were we to look for phosphates? That has been the great problem for those who have looked for the future progress of agriculture. There is a limit to the number of guano or bird islands, and the question was, what should we do? They talked about phosphatic minerals? Where? Why, there have been found small deposits of phosphate of lime, very hard and difficult of solution, in Spain, England, and Canada, but furnishing no adequate supply for the future. Now we are to supply the world with phosphates, and the world may thank the Yankees of these United States of America for the very thing I have to reveal here to-day.

"The announcement which I have to make is this. That there has been discovered in South Carolina a bed of phosphate of lime, the origin of which the wisest geologists have as yet been unable to discover, which contains, after it has been roasted and ground to a fine powder, seventy-five per cent. of phosphates, easily dissolved in sulphuric acid, and converted into superphosphates. The quantity

there is absolutely inexhaustible. The whole world may come to Charleston, and run their ships up the Ashley and Cooper Rivers and take in cargoes of the phosphate anywhere along the banks. There are hundreds of tons to the acre over just as many acres as you please to travel. I compare that, as a discovery for the interests of agriculture, with the discovery of petroleum for enlightening the world. It is of the same sort, and this mineral will be utilized and will be of immense benefit to mankind."

The phosphatic nodules hold some seventy per cent. of the phosphate of lime, and ten per cent. of the sulphate and carbonate. Professor U. C. SHEPARD, having examined the beds, says:

"The best beds lay at an average depth of eighteen inches from the surface; the nodules were from the size of a boy's fist to that of a man's head; the depth of the stratum from twelve to eighteen inches. Some such beds extended over hundreds of acres. These nodules are compact, very hard, sometimes brown in color; when dug up, very much of the mud adheres to them. They lie so close to one another that the amount produced from the best land appears incredible. Where the stratum is fifteen to eighteen inches in thickness, the actual yield exceeds, in some cases, one thousand three hundred tons to the acre; and much is wasted, the smallest lumps being neglected entirely.

"The mining of the deposits is easy, requiring only the digging a trench and picking out the nodules with a pick, the nodules being thrown into carts, placed on railways in some cases, the loose earth being thrown to the rear. The phosphates are brought to the river-bank and washed in large cylinders. Vessels can come up to the banks of the river and load there; the river admits as large vessels as can cross Charleston bar. The raw phosphates, clean and dry, were said to bring about fifteen dollars a ton in Philadelphia last Winter. This appears to me too high, especially if labor continues to be as abundant as it is in the South, and the extent of the deposit so great."

Professor AGAESSIZ is of opinion that this remarkable deposit is the result of the decomposed bones of extinct animals.

Plaster.—The gypsum of commerce—sometimes also called plaster-of-Paris, from being quarried near that capital. It was in-

roduced into Pennsylvania by BENJAMIN FRANKLIN, but experience has not justified his estimate of it as a manure. There are only five commonly cultivated crops which contain plaster in any sensible proportions, and of these there are raised in this country, lucern, red clover, and turnips. These are precisely the crops for which the farmer finds plaster, on most soils, to be a fertilizing top-dressing. Corn, potatoes, and most of the grasses, are also somewhat benefited by its use. It is a powerful deodorizer, and should be used plentifully about barns and out-houses.

Salt.—Salt applied in considerable quantities, as the sea-beach shows, completely sterilizes the soil. When used moderately to amend certain soils, it has been found very efficacious. It also cleans a field of grubs and weeds, and is used as a remedy for rust and smut in wheat. WILLIAM BACON, of Massachusetts, testifies that sown in small quantities among fruit-trees, it tends to destroy the curculio. Roots are sometimes much benefited by it. It is especially adaptable to clay loams, tending to lighten the soil. "Coarse, sour herbage, rejected or disliked by cattle, will be rendered grateful to their taste by the application of a sufficient quantity of salt; but this depends upon the quality of the land."* Mr. JOHN JOHNSTON says that on his wheat land "the application of two hundred and eighty to three hundred pounds of salt will hasten the maturing at least four days, besides giving a brighter straw, plumper grain, and finer sample every way, and I think," he says, "that four hundred pounds per acre might pay still better." It seems to be agreed that on some soils salt is detrimental, while on others it is very beneficial. This point can be ascertained only by actual experiment; and no other manure demands so much caution in its use.

Sea-Weed, as a manure, is subject to somewhat the same conditions as salt. It is much used all along the New England shore, where it floats in and lodges in heavy quantities, and farmers cart it inland, sometimes to the distance of ten miles. It should be plowed in as soon as gathered, when that is practicable, as it loses a portion of its virtues, even by composting.

Sea-Sand.—Some farmers have found it profitable to adopt the use of sea-sand as a bedding for all stock. One ton of sand will go about as far as a ton of straw, and its fertilizing effect in the resultant manure is said to be very striking.

Soap-Suds.—"I say now that ar is a wicked waste—d'ye know it, neighbor FLANDRY?" "What, Uncle ENOCH? Dunno as I quite understand ye." "Why, throwin' out and wastin' that way all them soap-suds, the way your gals there is doin'." "What is soap-suds worth, Uncle ENOCH?" "Bout a hundred dollars, I guess; what your folks 'll make 'tween now and Spring. Ourn was worth more'n that last Winter, and I guess our folks don't wash more dishes and clothes 'n yourn." "Why, what in 'natur do you do with soap-suds to make 'em worth that, Uncle ENOCH?" "Didn't I tell ye? Wal, raly now, I meant to done it, and I will now. We save every mite of our suds and dishwater for the garden and truck patch, splashin' it over the ground 'bout once a week all Winter. A tubful of suds 'll go as fur as a wheelbarrow load o' manure. Its good for gooseberries and currants, and kills a powerful lot of bugs and beetles, and pesky worms, and fattens the ground more 'n a hundred dollars' worth besides. That's what soap-suds is good for."

If you do not wish to "splash" your suds over the ground in the Winter time, as Uncle ENOCH did—for it is not the best way—pour them upon your compost heap.

Soot is a powerful stimulant but too scarce to justify comment.

Sulphate of Iron.—The *British Medical Journal* states, as a new discovery, that wonderful effects may be obtained by watering fruit-trees and vegetables with a solution of sulphate of iron. Under this system beans will grow to nearly double the ordinary size, and will acquire a much more savory taste. The pear seems to be particularly well adapted for this treatment. Old nails thrown into water and left to rust there, will impart to it all the necessary qualities for forcing vegetation as described. Iron dust is also sometimes used to heighten the colors of flowers.

Professor Ville's New System.—Is Agriculture an exact science? Perhaps so; it

* DOYLE'S Encyclopedia, p. 336.

is certainly rising rapidly from the "haphazard" condition, and is becoming every day more rational, systematic, and certain in its processes. Among the most brilliant discoveries of the day are those of M. GEORGE VILLE, Professor of Vegetable Physiology at the Museum of Natural History, at Paris, who, after an experimental study of ten years, seems to have possessed himself of some of the important secrets of vegetation. Giving up the ordinary complex methods of analysis, he returned to first principles—the synthetic method.

He took common flower-pots for his field; clean white sand for his soil. To the barren sand he added a few essential properties—for instance, the phosphates, potash, nitrogen, and lime. He found that when one constituent was added, certain plants grew in it, while others did not. Another constituent being added, a larger number of plants would grow; and when, in short, all these four constituents were added, in their proper proportions, a full crop of any desired vegetable or plant was obtained.

The farmers laughed at VILLE's "plant-making machinery," but he persevered, and on a farm set apart for his use by the Emperor, he demonstrated his propositions to be true, and prepared an accurate table of the food of plants. Patient and careful observation led him to recognize—what LIEBIG had already shown analytically—that the aliment preferred by cereals is *nitrogen*; by leguminous plants—peas, beans, clover, etc., *potash*; by roots, the *phosphates*. These are not the *exclusive* elements, as already shown; for these three substances, in various proportions, are necessary to each and all, and even lime, which humus renders assimilable, must be added. One fertilizer is attached to each class of plants, only to indicate that it is the element which is most essential.

For four years previous to 1864, many curious visitors were shown plots of ground manured and sown in accordance with Professor VILLE's system. Some of them had been planted four times in succession with the same kind of crop, giving at the commencement what he calls a complete manure, and adding yearly the ingredients principally absorbed by the crop—thus showing the possibility of growing the same crop, at the maximum, for a series of years, without rotation. Upon others the crops were changed yearly, so that each year the particular crop required principally

a different agent; then, after passing through the series furnished by the complete manure the ingredient principally required by the crop proposed should be added, till the crop showed, by a falling off, that the complete manure was again wanted. Under these circumstances, the crops reached to results of irrefutable eloquence.

By adding nitrogenous matter, phosphate of lime, lime, and potassa—that is, a normal and complete manure—to calcined sand—the seed-wheat being equal to 1—the full crop of wheat was represented by 23.

Upon withdrawing the lime from the mixture of four elements, the crop fell to 21.62.

Upon restoring the lime, and omitting the nitrogenous matter, the crop fell to 8.83.

Then, withdrawing the potassa, the crop fell to 6.57.

When the phosphate of lime was also withdrawn, the crop was reduced to 0.77, vegetation ceased, and the plant died.

By adding humus to the complete manure, the crop was increased to 33. The lime, which in the absence of all organic matter, influences the yield but little, manifests a very decisive action in the presence of humus. Humus, alone, produces no effect.

After experimenting on a large scale, Professor VILLE was able to arrange the following table:

Average Wheat Crop per Acre.

	Complete manure...	Without nitrate...	Without minerals...	Without potash...	Without phosphates...
	lbs.	lbs.	lbs.	lbs.	lbs.
Straw	11,061	6,952	8,580	10,117	11,039
Grain	5,903	3,617	4,313	4,721	4,825
	16,964	10,569	12,893	14,838	15,864

This table shows that without phosphates the crop was nearly equal to that with a complete manure—without potash, it sensibly diminished; without nitrogenous matter, it was very inferior. The *complete manure* gives an increase over that without nitrates, sixty per cent.; without minerals, thirty-one per cent.; without potash, fifteen per cent.; without phosphate, seven per cent. These results are almost exactly like those derived from experiments on a small scale.

Professor VILLE publishes a table of the quantity of the four agents contained in the

crops, and in the complete manure, per acre. We introduce it here:

	Weight of the crops raised, lbs.	Nitrogen, lbs.	Phosphoric acid, lbs.	Potassa, lbs.	Lime, lbs.
Spring wheat..	6,080	73.03	26.36	33.02	17.80
Beet-root.....	8,972	289.53	46.59	134.21	67.56
Barley	7,058	108.89	33.22	72.06	35.86
Peas	5,145	118.17	35.60	82.39	112.93
Complete manure.....		133.10	176.00	176.00	176.00

So that the complete manure contained in this case, for these four crops, 153 pounds of nitrogen, 176 pounds of phosphoric acid; 176 pounds of potassa, and 176 pounds of lime, the nitrogen being in the state of nitrate of soda or of sal ammoniac; the phosphoric acid in the state of phosphate of lime; the potassa in the state of carbonate of potassa; and the lime in a caustic state.

By carefully obeying these hints, M. VILLE insists that he can produce wheat upon wheat, peas upon peas, beet upon beet, for an indefinite term of years, without any rotation; first having recourse to the complete manure (the four named ingredients), and afterward administering only the *dominant* element, until a decrease in the crop shows a lack of the auxiliary elements, when the complete manure must be renewed.

JOHN A. RIDDLE, of New Hampshire, in a pamphlet in explanation of VILLE's system, anticipates that "by the use of the new method we may abolish the old practices and replace them by a simpler agriculture, more manageable and more remunerative. Instead of, by great care and precaution, *maintaining* the fertility of the soil, we *reconstitute* it, by means of the four agents pointed out, which can be derived from the great storehouse of nature, and

added to the usual stock of farm manure. No cattle need be kept."

We trust that our readers will not be quite so sanguine and enthusiastic as this writer. Let no farmer tear down his barn, or plow up his barn-yard or sell his cattle. The agricultural millenium has not come yet. The compost heap must still be the main reliance. Cattle and crops must continue to be each the offspring of the other. For, in the first place, certain localities *require* a perfectly raw manure, as a sort of yeast, to create fermentation in the soil. In the second place, it is believed that farmers generally can furnish the elements mentioned, cheaper in stable manure than in a purer state. As a correspondent says: "If we had free tickets to this 'great storehouse of Nature,' all would be very fine; but unfortunately the substances named are costly. No man requires to be told that the addition of ground bones, or superphosphate, or guano (ammonia), or lime, will be of advantage to the soil. We are all glad to add these things *when we can get them*; but with superphosphate at \$50 to \$60, and guano at \$80 per ton, it becomes a serious question as to how far it pays to buy these things and dispense with farm-yard manure."

Yet we agree with LEVI BARTLETT that "the principles are correct," and with the *Journal of Chemistry* that "it is impossible to doubt the importance of Prof. VILLE's investigations." Thousands who can not keep cattle, who live near cities, who desire to crop without rotation, can apply the system with great benefit. Indeed, all intelligent farmers can advantageously study it, and use it as an assistant and regulator of the inaccurate present method of culture. These pages have already pointed out the most economical means of obtaining the required fertilizers.

PLOWING:

PRACTICAL EFFECT OF PULVERIZATION.—HOW TO PLOW AND WHEN.

WE ought to cultivate more land!—not sideways but downward—toward China instead of toward sunset. Farmers plow too wide and too shallow; if they would dig deeper and narrower, on almost all soils, they would reap greater harvests at less expense. "We must, more than ever before," says the *Genessee Farmer*, "realize the fact that *tillage is manure*—that the literal meaning of the word 'manure' (*manus*, hand, *ouvrer*, to work), is hand-labor. To manure the land is to hoe, to dig, to stir the soil, to expose it to the atmosphere, to plow, to harrow, to cultivate. The ancient Romans made STERCUTUS a god because he discovered that the droppings of animals had the same effect in enriching the soil as to hoe it."

Merely to alter the texture of a soil by mechanical means has the effect to fertilize it by allowing a more free transition of air and water, these substances imparting some element held in combination, such element uniting with some of the other elements of the soil, and setting others free, ready to form new combinations, or to enter into plant structure as food.

Suppose a soil which weighs about 1,000 tons per acre is pulverized so as to be freely permeable by the atmosphere, and that such a soil, after being thoroughly dried, is exposed to the air, then we find from the experiments of SCHUBLER, that it will absorb water in twenty-four hours:

If a sandy clay, equal to.....	2½ tons.
If a loamy clay.....	30 "
If a stiff clay.....	36 "
If a garden mold.....	45 "

The inquiry is closely connected with the good effects produced in most soils by deepening and pulverizing them. Well-pulverized soils absorb much more dew than when suffered to remain close.

Deep plowing gives the descending rains a deeper lodgment in the soils, and so provides a storehouse for retaining the ammonia till it is

needed for plants. In the West, especially, it matters little how deep the plow goes. Almost every farm is made up of half a dozen farms laid one upon another; and there is no danger of plowing through. A trial is the best proof; plow two feet deep next year, and test the harvest. The Belgians plow three feet deep.

The *Journal of Applied Chemistry* thus gives the philosophy of plowing: "The effects of pulverizing or stirring the soil are numerous:

1. It gives free scope to the roots of vegetables, and they become more fibrous in a loose than in a hard soil, by which the mouths of the pores become more numerous, and such food as is in the soil has a better chance of being sought after and taken up by them.

2. It admits the atmospheric air to the spongioles of the roots, without which no plant can make a healthy growth.

3. It increases the capillary attraction or sponge-like property of soils, by which their humidity is rendered more uniform, and in a hot season it increases the deposit of dew, and admits it to the roots.

4. It increases the temperature of the soil in the spring by admitting the warm air and tepid rain.

5. It increases the supply of organic food. The atmosphere contains carbonic acid, ammonia, and nitric acid, all most powerful fertilizers and solvents. A loose soil contracts and condenses them. Rain and dew also contain them. And when these fertilizing gases are carried into the soil by rain water, they are absorbed and retained by the soil for the use of plants. On the other hand, if the soil be hard, the water runs off the surface, and instead of leaving these gases in the soil, carries off some of the best portions of the soil with it.

6. By means of pulverization, a portion of atmospheric air is buried in the soil, and it is supposed that ammonia and nitric acid are formed by the mutual decomposition of this air

and the moisture of the soil, heat also being evolved by the changes.

7. Pulverization of the surface of the soils serves to retain the moisture of the subsoil, and to prevent it from being penetrated by heat from a warmer, as well as from radiating its heat to a colder, atmosphere than itself. These effects are produced by the porosity of the pulverized stratum, which acts as a mulch, especially on heavy soils.

8. Pulverization also, as the combined effect of several of the preceding causes, accelerates the decomposition of the organic matter in the soil, and the disintegration of the mineral matter, and thus prepares the inert matter of the soil for assimilation by the plants."

HORACE GREELEY read an excellent Essay on deep plowing, before the American Institute Farmers' Club, December 1, 1868. We quote it entire:

"Many controversies result from imperfect definitions. The same words and phrases convey different ideas to the rival disputants.

Let me begin, then, by making myself clearly understood. To save time, I will define by negation or exclusion—as follows:

All soils do not require plowing to the same depth, because

1. A large portion of the earth's surface should never be plowed at all. No wet lands should be plowed until thoroughly permanently drained; plowing them while still wet, or certain to become so after rains, is throwing labor away. A very large area, consisting of swamps, marshes, bogs, fens, sea, lake, river, and brook margin, or intervalles frequently submerged or sodden, should never be plowed until drained or embanked.

2. Then a great proportion of the rocky hillside or crests, which consist mainly of rocks thinly covered by and often protruding through the soil, should never be plowed, but should be kept always in forest from which timber is taken from time to time, but never to such extent as to reveal its ruggedness. Westchester County alone has thousands of acres, now denuded and devoted to grazing, which should never have been cleared. Cut off the timber, if you are not content with cutting out, but keep such rough land always in wood. Its cultivation can never pay; its grass is burnt up by a sultry week; while stripping it of timber tends to render our springs and streams scanty and capricious. There is nothing worse in our rural economy than this uncovering of rocky steeps that ought to remain timbered evermore.

3. There are, moreover, lands too sterile to be cultivated with profit, at least while so much good land lies idle and useless. These lands are often level enough, and not too stony; but it will cost more to bring them to a proper state of fertility than they will then be worth. Some of these might be, and probably ought forthwith to be, sowed with nuts and tree-seeds, and so covered with timber; probably the plow might be advantageously used in the process; but it would be unwise to subject them to other culture for ages yet, if ever.

4. Then there are lands which have a good though shallow surface soil, but covering a poisonous subsoil, which must not be disturbed. Professor MAPES found such a tract in West Jersey, where a stratum of sulphate of iron (copperas) lay but eight inches below the surface. To plow into this and mix it with the surface soil, arrested vegetation altogether.

5. And again: There are soils mainly alluvial, at once so mellow and so fertile that the roots of the cereals, and of most plants, will permeate and draw sustenance from them, if they are never disturbed by the plow. I presume the annually flooded intervalle of the Nile is of this class. I judge that the valley south of Marysville, California, annually covered many feet deep by the turbid floods of the Yuba, Feather, and American rivers, is much the same. There are portions of the intervalle of the Illinois, where the muck is sixteen feet deep, very loose, and very rich. I was told in California that the grape, though it had to be watered sparingly during its first two Summers, needed no irrigation thereafter in the valleys of that State, though they are dried up in Summer to a depth of several feet. The roots strike down through the rich loam below till they find moisture that they can appropriate and thrive upon. I judge that the valley of the Sacramento and its main tributaries is often parched to a depth of four or five feet.

I have thus fully conceded that deep plowing is not everywhere requisite. Now let me show where and why it is needed:

1. It has been abundantly demonstrated here that the roots of plants are often found at a distance of several feet from the stem.* Any

*In the New York State Agricultural Society, in 1865, Mr. P. T. QUINN, urging the necessity of deeper plowing, said: "Why, come over to my farm, gentlemen, and I will show you celery, common celery, sending down roots thirty-one inches—corn going from thirty to thirty-six inches into the earth—squashes sending out rootlets four or five feet, and going down sixteen inches. Can I be persuaded that these plants gain nothing by having a

of us may have seen that this is as true of Indian corn as of Canada thistles; with a microscope and due patience, the roots of wheat may be traced from four to six feet. Of course, these roots seek nourishment and find it. Nature, in the broad view, makes no abortive, at least no wanton, effort. Roots wander in search of food not otherwise to be found.

2. Our subsoils are generally compact and repellant. Wherever a ditcher would naturally use a pick, there few roots can make their way, except very slowly and by wasting effort. Few or no cereals or edible roots can feed and flourish on the penetration of such subsoils. And, while our sands and looser gravels are more easily traversed, they seldom contain the plant-food whereof the roots are in search. They either remain unpenetrated, or the effort is unrewarded by any gain of nutrition to the plant.

3. Our Summers and Autumns are often persistently hot and dry. The continuously torrid suns which this year destroyed half the later crop of Europe, are here encountered as often as every third year. Drouth is one of the foremost causes of the failure of our crops. Our ancestors mainly emigrated hither from the British Isles, from Holland, and the coasts of Northern and Western Europe, where humidity is the rule, protracted drouth the exception. Sixteen inches of soil in our climate is hardly equal, as an antidote to drouth, to six inches in Ireland or Holland. And yet the best farmers of those countries agree in commending deeper plowing.

4. What we advocate is not the burying of the vegetable mold, or natural surface-soil, under several inches of cold, lifeless clay, sand, or gravel. If the subsoil is not to be enriched, it may better remain the subsoil; but that does not prove that it ought not to be lifted, stirred, aerated, pulverized. The right thing to do is to enrich as well as mellow and aerate the entire soil to a depth of fully eighteen inches, though twelve may answer as a beginning. Use a Michigan or a subsoil plow, if you will, and keep the various strata where Nature placed them; but give your plants, like your cattle, a chance to reach food and drink at all times. Let down the bars that would keep them from the life-giving springs.

5. Plants look to the soil for 1, anchorage; 2, moisture, 3, most of their food. If they can

not find these more certainly and more abundantly in twelve to eighteen inches of soil than in six, then reason is a fool, mathematics a conjectural science, and a farmer should prefer a balance in bank to his credit of \$600 to one of \$1,800.

6. We are told that roots prefer to run near the surface, loving the warmth of the sun. Let them run there, then; we do not hinder them. Make the soil rich as well as deep, and let them run near the surface for warmth, or descend for moisture, or both, as they shall see fit. We proffer them freedom of choice. If a wet season attracts them to the surface, a dry one must constrain them to dive for moisture. It is our duty so to provide that they may flourish, however wayward the season.

7. I have a steep hillside, which I choose to cultivate, the soil being warm and kind. Plow this six inches deep, and the first hard shower sweeps its soil, by cart-loads, into the brook below, where it is useless. Plow it twice as deep, and not a peck of soil will be flooded off in a lifetime.

8. In a wet season deep plowing does, at the worst, no harm. In a dry season it doubles the crop.

9. Unless a small army is more effective than a large one, an empty pocket-book better than a full one, a lean crop preferable to a large one, then a deep soil must be more productive than a shallow one."—HORACE GREELEY.

The fact is placed beyond controversy that plowing twice as deep as the present average, on almost any arable soil, will prove a striking advantage to the crops, and, with fair manuring, is the best means of renovating exhausted land.

Hon. HORACE CAPRON, Commissioner of Agriculture, thus sets forth the necessity of deep plowing, in his report for 1867: "We may not be able to calculate the precise amount of increase in production due to an additional inch in depth of cultivation, but experiments have shown that in many soils it bears, relatively, a near proportion to the increase in depth of culture; so that, where the soil is now worked to six inches, an inch greater depth of cultivation would give nearly one-sixth more production. The agricultural produce of 1867, of those articles which would be influenced by depth of culture, has a total value of at least \$1,500,000,000. Now, an increase of even one-tenth of this amount by an additional inch of culture, would add \$150,000,000 to the value of the annual agricultural productions of the country!"

deep as well as rich soil? Take the crop of cabbages, and show me a farmer who can make anything on cabbages with five inch plowing." General HARMON, of Monroe County, said he had traced wheat roots to the depth of four feet.

How to Plow.—The following practical comments are from a paper by DONALD G. MITCHELL, in *Hours at Home*: "One of the most striking of those contrasts which arrest the attention of an intelligent agricultural observer, between the tillage of English fields and those of New England, as well as of America generally, is in the matter of plowing. In England, bad plowing is rare; in New England, good plowing is even rarer. Something is to be allowed, of course, for the irregular and rocky surface of new lauds, but even upon the best meadow bottoms along our river courses, a clean, straight furrow, well turned, so as to offer the largest possible amount of friable mold for a seed bed, is a sight so unusual, that in a month of Spring travel we might count the number on our fingers. I go still further, and say—though doubtless offending the patriotic susceptibilities of a great many—that not one American farmer in twenty knows what really good plowing is. Over and over the wisecracks at the county fairs give their first premiums to the man who, by a little deft handling of the plow, can turn a flat furrow, and who wins his honors by his capacity to hide every vestige of the stubble, and to leave an utterly level surface. But a flat furrow, with ordinary implements, involves a broad cut and a consequent diminution of depth. The perfection of plowing upon sward land implies on the contrary, little pyramidal ridgelets of mold, running, like an arrow's flight, the full length of the field—all which a good cross-harrowing will break down into fine and even tilth, like a garden-bed."

Fall Plowing.—If heavy clay or loamy soils are plowed in the fall, the natural agents, air, water, and frost, will be silently at work all Winter, enriching the ground and mellowing it better than could be done by any work of man. The *Country Gentleman*, objects to this, however, in cases where there has been no underdraining, unless the lands are so situated that surplus water may be readily carried off. It is claimed by many that sandy soils do not receive so much benefit as injury from fall plowing, as it

is believed that by exposure to rains and wind the light, soluble manures are exhaled, or washed out.

A correspondent of the *New England Farmer*, names the following as some prominent advantages to be derived from fall plowing:

1. August and September is a good time to turn over bound-out sod land, and manure and re-seed it at once to grass, obtaining a crop of hay the following year.

2. October and November is an excellent time to break up sod land for planting the following Spring.

3. The weather is then cool and bracing, and the team strong and hearty for the work; while the weather in the Spring is more relaxing and team less able; and Spring work being always hurrying, it saves time to dispatch as much as possible during the previous Autumn.

4. Sod land, broken up late in Autumn, will be quite free from growing grass the following Spring; the roots of the late overturned sward being so generally killed by the immediately succeeding Winter that not much grass will readily start in Spring.

5. The frosts of Winter disintegrate the plowed land, so that it readily crumbles in fine particles in Spring, and a deep, mellow, seed-bed is easily made. The chemical changes and modifications resulting from atmospheric action during the Winter, develop latent fertility in the upturned furrows, which, together with the mellowing influences, materially increase the crop.

6. Most kinds of insects are either wholly destroyed, or their depredations materially checked by late fall plowing, especially the common white grub and the cut worm.

7. Corn stubble land may be plowed late in the fall, and thus be all ready for very early sowing in Spring, thereby going far to insure a good catch of grass; the roots of the new seeding getting hold well, or being well established before the drouths of Summer come on.

All Western farmers know that some of the above rules can not be applied profitably to breaking prairie land.

DRAINAGE AND IRRIGATION:

METHODS AND ADVANTAGES CONSIDERED.

DRAINAGE and Irrigation—the former having for its primary purpose the relief of fields that are too wet, and the latter the replenishment of fields that are too dry—are not so much practiced in this country as in Great Britain* and continental Europe, where labor is plenty and lands scarce and high. They ought rapidly to increase among us, however, as population becomes denser.

The philosophy of both processes was well enough illustrated by the professor in a French College before his class: "Take this flower-pot," said he, "what is the use of this small hole at the bottom? To enable us to renew and remove the water. Why is this necessary? Because water gives life or death; life, when it is only made to pass through the bed of earth, for it leaves with the soil its productive principles, and renders soluble the nutritive properties destined to nourish the plant; death, on the other hand, when it remains in the pot, for it soon becomes putrid, and rots the roots, or accumulates and drives out the air which is the breath of vegetation."

Drainage.—I may be asked, observes the great English agriculturist, MECHI, why I attach so much importance to drainage. Why, you might as well ask, do I attach so much importance to circulation, vital or monetary. Stagnant water, or stagnant air, are as ruinous to plants as they would be to our own vitality. Fix a cork in the drainage-hole of your flower-pot, and you will soon have a practical illustration of my meaning. The fallow and bilious plants (like many turnip crops I know of on undrained land), will show by their expression what is denied to them in speech. This is not the occasion to enter into subterranean examination of gravity, capillary attraction, aeration,

or filtration, much less of all those affectionate or repulsive interchanges that turn air, water, and earth into food for man and beast: But be assured, circulation is vitality—stagnation, death and ruin.

RALPH WALDO EMERSON, in a characteristic address in his native town, said: "Concord is one of the oldest towns in the country—far on now in its third century. The selectmen have once in five years perambulated its bounds, and yet, in this year, a very large quantity of land has been discovered and added to the agricultural land, and without a murmur of complaint from any neighbor. By drainage, we have gone to the subsoil, and we have a Concord under Concord, a Middlesex under Middlesex, and a basement-story of Massachusetts more valuable than all the superstructure. Tiles are political economists. They are so many Young Americans announcing a better era, and a day of fat things."

Some of the beneficial results of drainage are generally recognized. Drainage removes stagnant water from the surface and surplus water from under the surface. It lengthens the seasons. It deepens the soil. It warms the subsoil. It equalizes the temperature of the earth that comes in contact with plants. It increases the quantity of crops, and improves their quality. It augments the effect of manure. It tends to prevent Winter-killing, injury from drought, rust in wheat, and rot in potatoes. It drives out weeds and the ox-eyed daisy.

Drainage is full of paradoxes. It makes cold land warmer, and warm land cooler; wet land drier, and dry land wetter; heavy land lighter, and light land, in some cases, heavier. It brings up moisture from the depths below, and with it soluble food that else could not rise sufficiently near the surface; while it tempts the plant-roots to seek the lower strata where they find fresh water without losing their food and light and air.

*As early as 1855, there had been 1,365,000 acres permanently drained in Great Britain; and the Duke of Portland had made on his estates more than seven thousand miles of drains.—*Estimates of J. BAILEY DENTON.*

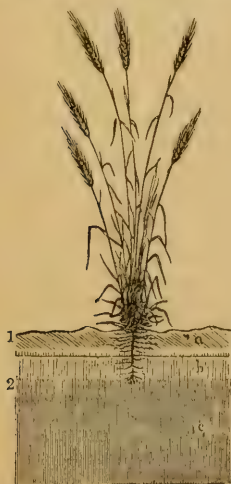
The Secretary of the New York State Agricultural Society, in one of his reports, says: "The testimony of farmers in different sections of the State, is almost unanimous, that drained lands have suffered far less from drought than undrained." Alleghany County reports that "drained lands have been less affected by the drought than undrained;" Chataqua County, that "the drained lands have stood the drought better than the undrained." The report from Clinton County, says: "Drained lands have been less affected by the drought than undrained." Montgomery County reports: "We find that drained lands have a better crop in either wet or dry seasons than undrained."

B. F. NOURSE, of Orrington, Maine, says that on his drained lands, in that State, "during the drought, there was at all times sufficient dampness apparent on scraping the surface of the ground with his foot, in passing, and a crop of beans was planted, grown, and gathered there-

from, without as much rain as will usually fall in a shower of fifteen minutes' duration, while vegetation on the next field was parching for lack of moisture.

A committee of the New York Farmers' Club, which visited the farm of Professor MAPES, in New Jersey, in the time of a severe drought in 1855, reported that the professor's fences were the boundaries of the drought, all the lands outside being affected by it, while his remained free from injury. This was attributed, both by the committee and by Professor MAPES himself, to thorough drainage and deep tillage with the subsoil plow.

The accompanying engravings will show the effect which stagnant water within a foot or two of the surface, has on the roots of wheat plants. They should enable the reader to see why thorough underdraining is beneficial in time of drought:



SECTION OF LAND BEFORE IT IS DRAINED.



SECTION OF LAND AFTER IT IS DRAINED.

In the first figure, 1 represents the surface-soil, in which evaporation takes place, using up the water which might otherwise go to the roots of plants; *b*, represents the water-table, or surface of stagnant water, below which roots seldom go; *a*, water of evaporation; *b*, water of capillary attraction; *c*, water of drainage, or stagnant water.

In the second figure, 1 represents the surface-

soil warmed by the sun and Summer rains; 2, the water-table nearly four feet below the surface; *d*, water of capillary attraction; *e*, water of drainage, or stagnant water.

In a well-drained soil, the earth is permeable to rain and dew, and the numerous roots absorb it readily in seasons when the ground in the undrained soil is baked and the few roots famished.

Drainage improves the healthfulness of the locality. A doctor took one of the Sanitary Commissioners to a hill overlooking his district. "There," said he, "wherever you see those patches of white mist I have, frequent illness, and if there is a cess-pool, or other nuisance as well, I can reckon on typhus every now and then. Outside these mists I am rarely wanted."

Dr. BOWDITCH testifies that "there are two or three times as many deaths from consumption in wet places as in dry."

Will Draining Pay?—Yes. Draining by some method will pay in almost every instance where arable or meadow land is too wet, even in America. To lay manure on wet soils is to throw money away. DANIEL GATES, of New York State, testifies that draining has increased his land to "three times its former value." Mr. LUTTON said, in the New York State Agricultural Society, that for four successive years he applied twenty-five loads of manure per acre to seven acres, and reaped thirty-one bushels of oats per acre; he then drained the same land, and *without* manure, it produced eighty-nine and a half bushels per acre.

JOHN JOHNSTON, a Scotchman, came to this country poor; purchased a farm in 1835, near Geneva, New York, said to be the poorest land in that section of the State. It was a heavy, gravelly clay, with a close clay subsoil; and it had been cropped down by former owners, until, instead of being a farm to live on, it had become proverbially a place to starve on; but by a thorough system of tile drainage (not then much known in the country), followed by deep plowing and manuring, Mr. JOHNSTON soon made it produce better crops than the best farms in that section, and by its help found himself owner of three hundred acres of the most productive land in the county. He was never a capitalist, and never engaged in fortunate outside speculations. He was solely a working farmer, and he owed his success chiefly to his system of subsoil drainage. His drains are fifty miles in length.

What Lands require Drainage?—Mr. GREELEY thinks that *all* lands worth plowing would be improved by draining. But Hon. HENRY F. FRENCH, in his admirable little manual on Farm Draining, insists that some land does not require it, as nature herself has thoroughly drained a large proportion of the soil. He sets forth the following descriptions of soil as requiring drainage: all lands over-

flowed in Summer; all swamps and bogs; and all soils that contain too much water at any time. There is probably not one farm in fifty that does not need considerable thorough draining; and the venerable JOHN JOHNSTON, the original tile-drainer of this country, thinks that four-fifths of all our lands require this relief.

Will Underdraining Pay?—This depends on circumstances. If good, naturally underdrained land can be obtained in your neighborhood—as in most of the counties of the West—for from \$15 to \$20 per acre, it would not pay, in all probability, to expend \$30 per acre in underdraining low, wet, springy land; but in all districts where land is worth \$50 per acre, nothing can pay better than to expend \$20 to \$30 per acre in judicious underdraining. The labor of cultivation is much reduced, while the produce is generally increased one-half, and is not unfrequently doubled; and *it must be remembered that the increase is net profit*. If we get \$15 worth of wheat from one acre and \$20 worth from the other, and the expense of cultivation is \$10 in both cases, the profit from one is twice as much as from the other. That judicious underdraining will increase the crops one-third, can not be doubted by any one who has witnessed its effects. If it should double the crops, as it often does, the *profit* would be four-fold. Mr. JOHNSTON estimates that the average surplus profit on two years' crop will pay for the drainage.

Surface Draining.—On cheap lands, where tile drainage seems too expensive, surface draining will afford to wet lands a partial relief, and will answer a very good purpose on all swales and wet places that are not fed by springs. If necessary, let off the water by plowing a furrow, or by opening a trench with the spade; then plow the field. After the sod has rotted so that you can plow to advantage, mark out a land, the center of which will be where you want your drain, with the outside extending, if practicable, to where the ground ascends. Plow deep, repeatedly lessening the land a little at each plowing, so as not to leave a ridge between the outside of the field and the center. By plowing from three to five times, and clearing out the dead furrow in the center, with a shovel or spade, you will have a drain two or three feet deep, that will last for years. This can be stoned up, if you prefer it, and become permanent in the form of an open ditch.

And such ditches may be multiplied as the land seems to require it. They are very beneficial, as compared with none at all; but they are expensive; they obstruct good husbandry, especially impeding mowing machines; they occupy too much land; they carry off much of the manure; they are but a clumsy expedient; and something better should be substituted for them as soon as practicable. But remember that the sides of an open ditch should always slant, at least forty-five degrees.

Under Drains.—Among the first covered drains in use, were those made by throwing stones into the bottom of a ditch, and replacing the earth above them. These “blind ditches” have sometimes produced marvelous effects, drying up the moist lands and bringing in clover plentifully—but in two or three years they generally fail entirely. They become choked with earth or weeds; the stagnant water again soaks in the soil, and the wild grass re-appears.

Brush draining—that is, blind ditches filled with brush instead of stones—have been somewhat used. In a peat or clay soil, they last a number of years—sometimes ten or twenty, though always liable to clog; but in sandy soil they are quite unreliable. In fact, both the stone and the brush drain, are generally in the end more expensive than the tile drain. The mole-plow is somewhat used in the West, and has been found serviceable in soils that are exclusively clay. But for general use, nothing yet has been found to be equal to

Tile Drains.—Tiles form the most perfect channels for underdrains. They may be

heavy weight of earth above from sinking the edges into the soil (figure 3). This is, however, complex and expensive, and hence the tubular tile is now generally used. They are most

rapidly and easily laid by means of the tile hook (figure 5), which is simply placed within the bore, and they are lowered to their place. A little earth is then rammed down on each side, to keep them straight until covered. Where the soil is quite soft, they must be laid upon flat stone, tile soles, or narrow boards of durable wood. They may be first covered with straw, small brush, gravel, or small stone, or, if collars are placed on the joints, inverted turf may be laid in direct contact with the tile. If in hard clayey earth, small stone alone will answer, with straw or turf placed upon them before the earth is filled in. But if the subsoil approaches the nature of quicksand, more care will be required, and fine gravel, with a heavy coating of straw, may be necessary.

The importance of filling most of the ditch above the tile with stone, is sometimes urged, under the belief that water can not find its way down to the bottom through three feet of earth. But a moment's thought will show the fallacy of this objection, for if the drain will carry off the water lying one rod distant horizontally it will convey away with far greater ease what happens to be only two or three feet directly above.

It was once the practice to perforate tile with small holes, to let the water pass into them; but it has been since found that the joints at the ends and the porosity of the tile will admit all that is required.

Laying out Drains.—The first operation necessary upon a field intended to be drained, is the examination of the strata, or veins of earth of which it is composed; and this is commonly effected with the boring auger, or by digging small pits, or open drains, as by this means the oozings or weepings will speedily display themselves, and indicate pretty correctly the source whence the superabundant water proceeds. This being ascertained, the direction of the underdrains will be the more easily decided. In the formation of these drains the workman always commences on the lowest extremity; by this means, besides other advantages, the water, as he arrives at it, drains away from him, and shows him, by its escape, that he is preserving a proper fall.



Fig. 1. ROUND TILE.



Fig. 2. HORSE SHOE TILE.



Fig. 3. SOLE TILE.



Fig. 4.

tubular, as shown in figure 1, and laid in the bottom as represented by figure 4; or, they may be in the horse-shoe form, like figure 2, which answers a good purpose when placed on a very hard or rocky bottom; or, if the bottom be not hard, which is most usually the case, plates of tile, termed *soles*, are first laid, to prevent the

The simplest mode of proceeding is most practiced, and is believed to be the best; that is, to run the parallel drains directly down the natural slope of the land, tapping them once or twice if the locations of water should render it necessary. Never step in the bottom of the ditch when laying tile. A spirit-level will be found convenient.

Depth and distance of Drains.—Experience has determined that twenty-five to thirty feet apart, for compact or clayey soils, and thirty-five to sixty for light and porous soils, are proper distances for accomplishing speedy and effectual drainage. Three or four feet is the most economical depth. When draining was first introduced into some parts of Great Britain, the drains were made one and a half or two feet deep, and eighteen feet apart. After many thousand miles were laid, they became defective. They were then made about three feet deep, and twice as far apart. This cost less, and was more efficient.

Size of Tile.—The larger tiles should be used near the outlet. Large mains and small feeders is the rule. The larger sizes are also necessary where the grade is slight; for example, a two inch tile with ordinary imperfections in laying, will carry off eight hundred or nine hundred hogsheads in twenty-four hours, with a descent of one foot in ten; while a four-inch tile will carry off about twice as much with a descent of only one foot in a hundred.

The size of a drain depends on two circumstances: its rate of descent and its length (the aggregate of main and branches). "The drains should be of such a magnitude as to carry off a thousand hogsheads per acre, in twenty-four hours. If each drain relieves a space of a rod on each side, or a strip of land two rods wide, it must be eighty feet long for an acre of this breadth, and carry off forty-two hogsheads every hour, forty-six gallons per minute, or three-fourths of a gallon per second. A tubular tile, two inches in diameter, and perfectly smooth and straight, would accomplish this if it had a descent of one foot in twenty. With ordinary imperfections, it would require a descent of about one foot in ten or twelve. If the descent was only one foot in fifty, it would require a three inch bore."* Almost any field can be drained, however flat. Rivers will run with a

Cost of Tile Drainage.—Tubular tile, with two-inch bore, which is large enough generally, except for main drains or those nearly level, usually costs about ten dollars at the manufactory, for enough to lay sixty rods. To be more definite, the following are the prices, by the 1000 pieces, at some of the prominent Tile Works in the country:

ROUND TILE.

1½ inch diameter.....	\$15 per 1000.
2 " "	20 " "
2½ " "	25 " "
3 " "	40 " "

SOLE TILE.

2 inch rise.....	\$15 per 1000.
3 " "	25 " "
4 " "	45 " "
5 " "	75 " "
6 " "	100 " "

HORSE-SHOE TILE.

2½ inch rise.....	\$15 per 1000.
3½ " "	20 " "
4½ " "	25 " "
5½ " "	45 " "
6½ " "	75 " "
7½ " "	100 " "

Round pipe tiles are generally preferred in England, and are rapidly coming into use in this country. They are much the most reliable. Tiles are cut thirteen to fourteen inches long, but drying shortens them to twelve and a half inches, and a fraction must be allowed for breakage; so it is estimated that a thousand tiles will lay a thousand feet of drain on an average.

Judge FRENCH, in his "Farm Drainage," gives the following experience under the head of "Expense:" "We have opened our drains of 4 foot depth, but 20 inches at top and 4 inches

about two rods wide, and one eighty rods long will drain an acre. The following table will show the size of the tile required to drain an acre in two days' time (the longest admissible), at different rates of descent; or the size for any larger area:

Diameter of Bore.	Rate of Descent.	Velocity of current per second.	Hogsheads discharged in 24 hrs.
2 inches.	1 foot in 100	22 inches.	400
2 inches.	1 foot in 50	32 inches.	560
2 inches.	1 foot in 20	51 inches.	900
2 inches.	1 foot in 10	73 inches.	1290
3 inches.	1 foot in 100	27 inches.	1170
3 inches.	1 foot in 50	38 inches.	1640
3 inches.	1 foot in 20	67 inches.	3100
3 inches.	1 foot in 10	84 inches.	3600
4 inches.	1 foot in 100	32 inches.	2500
4 inches.	1 foot in 50	45 inches.	3500
4 inches.	1 foot in 20	72 inches.	5600
4 inches.	1 foot in 10	100 inches.	7800

A deduction of one-third to one-half must be made for the roughness of the tile or imperfection in laying. The drains must be of some length to give the water velocity, and these numbers do not, therefore, apply to very short drains.

* Second Volume Annual Register Rural Affairs, p. 172.

† VELOCITY OF WATER IN TILE DRAINS.—An acre of land, in a wet time, contains about 1,000 spare hogsheads of water. An underdrain will carry off from a strip of land

at bottom, giving a mean width of 12 inches. In one instance, in the Summer of 1858, two men opened 14 rods of such drain in one day. In six days, the same two men opened, laid, and filled 947 feet, or about $57\frac{1}{2}$ rods of such drain. Their labor was worth \$12 00, or 21 cents per rod. The actual cost of this job was as follows:

847 two-inch tiles, at \$13 per 1000.....	\$11 01
100 three-inch, for main	2 50
70 bushels of tan to protect the joints	70
Horse to haul tiles and tan.....	50
Labor, twelve days, at \$1.....	12 00
Total.....	\$25 71

"This is $46\frac{1}{2}$ cents per rod, besides our own time and skill in laying out and superintending the work."

The following table gives the number of twelve-inch tiles required to drain an acre, being laid at different distances apart, and the number of rods of such drain to the acre:

Intervals between the Drains, in feet.	Twelve-inch Pipe.	Rods per Acre.
15.....	2404	176
18.....	2420	146 2-3
21.....	2074	125 5-7
24.....	1815	110
27.....	1613	97 7-9
30.....	1452	84
33.....	1320	80
36.....	1210	73 1-3
39.....	1117	67 9-13
42.....	1037	62 8-7

We may calculate that in the average of soils, at least three rods of four-foot ditch, twelve inches wide, will be dug and refilled by one man in a day. This would reduce the expense to the following statement:

Opening and filling, per rod.....	33 $\frac{1}{4}$ cents.
Tiles, at two cents each.....	33 $\frac{1}{2}$ "
Total cost of each rod.....	66 $\frac{3}{4}$ cents.

Multiply the number of rods to the acre, as shown in the above table, by two, and divide by three, and the answer will be about the number of dollars tile-drainage will cost per acre, at the different distances. Tiles ought to be furnished much cheaper than the above rates, and doubtless will be as soon as their use becomes more general.

There are now tile factories in every Northern State—no less than sixty in Ohio alone. No department of agriculture is making more rapid general progress than that of subsoil drainage.

Irrigation in its agricultural sense, implies the watering of grass lands with running water at certain intervals, by means of artificial constructions. It is the reverse of draining—they are the balancing forces in farming economy. Irrigation is least important, however, because

the average of lands have too much water. Yet it is no slight auxiliary. Snow has been called "the poor man's manure," and properly, for it not only warms, but possesses positive fertilizing elements. So does fresh water of almost any kind, when applied in moderate quantities, and as freely removed.

Early Irrigation.—The ancients learned and practiced this art. VIRGIL advised his people to "bring down the waters of the river upon the sunned corn, and when the field is parched and the plants drying, convey it from the brow of the hill in channels." The most wonderful remains of antiquity among the Chinese, Indians, Greeks, Romans, Syrians, Peruvians, and other nations are the immense aqueducts for the purpose of irrigation. No amount of labor or expense was deemed incommensurate with their importance and value to the nation. Through mountains and over valleys, spanning rivers and climbing precipices, for hundreds of miles went great arteries of stone, that carried the life-fluid through the parched and barren land. At the present day in many European and Asiatic countries the irrigation of land is by far the most important process of agriculture. By irrigation in the valley of the Po, "every rood of earth maintains its man." In Egypt the overflowing of the Nile is the source of all the fertility and wealth of the land; and in China and India, and on many parts of the Mediterranean coast, sowing and reaping are not more a matter of course than regular watering. In Italy canals are in some sections as numerous as roads, running along them for miles, with branches to the various farms and vineyards, and companies are established which have the privilege of supplying the farms with water at a prescribed tariff. In Germany, France, and even in the moist climate of England, the irrigation of fields has become a very common and profitable practice.

Irrigation in America.—There are several of our States, especially in the East, where the necessity of irrigation will soon force itself upon the public attention. In some neighborhoods the farmers already complain, about every other season, that their fruit falls untimely to the ground, their grain withers in the field, their potatoes bake in the earth, and their pastures scorch and dry up, till scarcely a green blade or a drop of water can be found for the stock.

It is evident that the seasons are gradually growing drier and hotter, owing to the vandalism of man in cutting off the forests, which attract and retain the moisture, and temper the winds that sweep over the earth. Many scientific writers have been for the last score of years warning our utilitarian people against the error of destroying our noble forests, but so long as there was a market for wood and lumber, or the land could be turned to a few dollars more account for some other purpose, they were laughed at as a set of croakers, and the present advantage was seized at the expense of the future. But within one or two years almost every agricultural society has begun to discuss the matter, and to evince a determination to plant again the forests which have been so ruthlessly destroyed.

The destruction of forests is not the only cause of the dryness of the seasons. The great net-work of railroads and telegraph wires which covers the face of the civilized globe, to say nothing of millions of lightning rods, with their thievish fingers thrust up into the clouds, are constantly drawing away the electricity, and by restoring the equilibrium between the clouds and the earth, prevent the storms that accomplish the same purpose in a noisy way. It is a man's mission to conquer the earth and subdue it, but in meeting the forces of nature and seeking to conquer them and render them subservient to his own ends, he should take care lest they flank him, and in the end turn his own batteries upon himself. It is never too late to mend, but it will take half a century to restore the trees that

were destroyed in a day. In the meantime many of our hills and dry places should be supplied with artificial sustenance, by means of a system of irrigation.

Method of Irrigation.—The whole art of irrigation may be deduced from two simple rules; which are, first, to give a sufficient supply of water during all the time the plants are growing; and, secondly, never to allow it to accumulate so long as to stagnate. As the water must flow in a sheet over the land, or in channels through it, the supply must be above the level of the land to be irrigated. This is one of the chief points to be considered. A main conductor should run along the top of the field, with small conduits passing out of it. The water must be drained off easily after being used.

Soils to which it is Adapted.—Light, porous soils show the effect of irrigation in a marked degree; and all sorts of dry and warm land receive almost instantaneous improvement from it. Boggy land, even in its natural state, is also greatly helped by it, and produces in consequence heavy crops of coarse hay, serviceable for store cattle; but clay soils are the least susceptible of benefit, unless they are first thoroughly underdrained. On a dry sloping meadow, where irrigation is practicable, it pays better than any other form of fertilization.

Many parts of the West are permanently deprived of its advantages, not possessing streams that can be thus utilized.

FIELD CROPS:

CEREALS, GRASSES, VEGETABLES, TEXTILES, ETC.—BENEFITS OF ROTATION AND
MODES OF CULTURE.

AT the time of the revival of letters, hardly 1,500 plants were known from the descriptions of the ancients. A hundred years ago, the Swede, CHARLES LINNE, generally called LINNÆUS, the father of botany, reckoned about 8,000 varieties; HUMBOLDT mentions 44,000; later observers have carried the number of ascertained sorts up to 100,000; and AGASSIZ has since returned from South America, and added largely to the enumeration. A chronicler of curious things estimates that "there are 15,000 useful plants known in the world; of these 3,000 are edible fruits, berries and seeds; 250 cereals; 75 kinds of Indian corn; 2,500 vegetables and salads; 300 shrubs, etc., which yield various drinks; and 260 aromatics. There are 50 substitutes for coffee, and 129 for tea. About 900 known plants are poisonous."

Amount of Different Crops.—A comparison of the total productions of the more important staples of the country, as returned by the census of 1850 and of 1860, with the estimates of 1867 for the same products, indicates a fair progression, under the adverse circumstances connected with a civil war which devastated one section and withdrew a heavy percentage of agricultural labor from the other. In the following table, which makes this exhibit, the items of corn and potatoes of 1867 are unusually small, those crops having suffered greater injury than for several years previous:

	1850.	1860.	1867.
Corn, bushels.....	592,071,104	838,792,740	768,320,000
Wheat, bushels.....	100,485,944	173,104,924	217,870,400
Rye, bushels.....	14,188,813	21,101,380	23,490,000
Oats, bushels.....	146,584,190	172,643,185	275,098,000
Barley, bushels.....	5,167,015	15,825,598	25,727,000
Buckwheat, bushels.....	8,296,472	17,717,818	21,354,000
Potatoes, bushels.....	65,797,896	111,448,867	67,783,000
Tobacco, pounds.....	199,752,655	434,209,461	323,724,000
Hay, tons.....	13,838,642	19,083,896	26,277,000
Cotton, bales.....	2,445,793	5,387,052	2,300,000
Wool, pounds.....	52,516,359	60,264,913	112,000,000

* FEARING BURR in his, well-known book, enumerates nearly 1,100 varieties of the field and garden vegetables of America.

Comparative Prices of Twelve Years.—The *Journal of Commerce* contains an interesting table of the comparative prices of various articles at New York on the first of May in each of the past twelve years. We quote some of these figures below:

	Wheat.	Rye.	Oats.	Corn.	Hay.	Hops.
1858.....	1.35	\$ 66	\$ 46	\$ 73	\$ 45	\$ 8
1859.....	1.70	84	54	86	75	13
1860.....	1.65	84	43	85	85	16
1861.....	1.65	68	36	67	80	16
1862.....	1.42	80	40	58	65	1 15
1863.....	1.20	1 03	85	94	80	20
1864.....	1.88	1 53	86	1 38	1 60	28
1865.....	1.85	1 03	72	1 48	90	35
1866.....	2.65	1 78	61	60	60	40
1867.....	1.40	1 38	83	1 40	1 90	60
1868.....	3.10	2 15	85½	1 20	80	50
1869.....	1.90	1 30	90	90	60	8

	Mess Pork	Mess Beef	Butter.	Cheese	Wool. Merino
1878.....	\$18 75	\$11 50	\$ 25	\$ 8½	\$ 37
1880.....	16 35	8 25	22½	10	56
1881.....	17 75	5 25	18	10	47
1882.....	17 87	6 00	16	7	53
1883.....	12 62	6 00	18	8½	49
1884.....	15 00	6 00	19	12	78
1885.....	26 50	8 00	31	17½	77
1886.....	26 00	14 00	35	20	70
1887.....	26 00	20 00	50	20	62
1888.....	22 80	16 00	28	19	65
1889.....	24 00	20 00	48	15	57
1890.....	31 00	12 00	38	22	54

If these quotations are trustworthy, as from their source we presume to be the case, we may judge of present prices (1869), more justly by reducing them to a gold standard (calling gold \$1 35) and placing them side by side with the average prices of the three years before the war, 1858-9-60, which were years of general prosperity with gold at par:

Average Prices May 1, 1858, 1859, 1860.	Price May 1, 1869, reduced to gold value.
Wheat, per bushel.....\$1 57	Wheat, per bushel.....\$1 40
Rye, " " "..... 78	Rye, " " "..... 96
Oats, " " "..... 48	Oats, " " "..... 67
Corn, " " "..... 80	Corn, " " "..... 75
Hay, per 100 pounds..... 72	Hay per 100 pounds..... 44
Mess Pork, per brl..... 17 62	Mess Pork, per brl..... 22 86
Mess Beef, " " "..... 8 33	Mess Beef, " " "..... 8 88
Butter, per pound..... 22	Butter, per pound..... 28
Cheese, " " "..... 9½	Cheese, " " "..... 16
Merino Wool, " " "..... 49	Merino Wool, " " "..... 40

Thus, of the ten articles, four are lower now than before the war, and six are higher—the most marked decrease being in hay, and the largest advance on cheese, oats, mess pork, butter, and rye, in the order named.

Weight of Grain, etc., per bush-

el.—Wheat is 60 pounds to the bushel in all the States except Connecticut, where it is 56 pounds; Rye is 56 pounds in nearly all the States; Corn 56 pounds in nearly all, but 58 in New York; Oats 32 pounds; Barley 48 pounds; Buckwheat 46 to 50 pounds, but mostly 48; Clover Seed mostly 60 pounds, but 64 in Ohio and New Jersey; Timothy 44 pounds; Flax Seed 56 pounds; Potatoes 60 pounds; Beans mostly 60 pounds, but 62 in New York, and 56 in Ohio; Blue-grass Seed 14 pounds; Hemp Seed 44 pounds; Dried Peaches 28 to 33 pounds; Dried Apples 22 to 28 pounds.

Rotation of Crops.—The necessity for a rotation in crops does not seem to have been at all felt until the middle of the last century, and not till after 1800 did it find its way to America to supersede the expensive habit of naked fallowing. It was then seen that the same crop, planted successively, year after year, gradually ran out, and demanded transplantation. Science has more recently taught us the reason for this, in the fact that each crop draws from the soil certain elements which are its natural food, and which it exhausts year by year. Meantime, those elements which would produce a vigorous growth of some other plant, lie dormant, or expend their force in the production and propagation of some vile weed which you do not want. "The true general reason why a second or third crop of the same kind will not grow well, is that it contains too little of one or more kinds of matter. If, after manuring, turnips grow luxuriantly, it is because the soil has been enriched with all that the crop requires. If a healthy barley crop follow the turnips, it is because the soil still contains all the food of this new plant. If clover thrive after this, it is because it naturally requires certain other kinds of nourishment which neither of the former crops has exhausted. If, again, luxuriant wheat succeeds, it is because the soil abounds still in all that the wheat crop needs—the failing vegetable and other matters of the surface being increased and renewed by the enriching roots of the preceding clover. And if now turnips refuse again to give a fair return, it is because you have not added to the

soil a fresh supply of that manure without which they can not thrive. Add the manure, and the same rotation of crops may again ensue."

On some of the rich, deep lands of the West, corn, and even wheat, have been occasionally produced, year after year, without obvious deterioration; but this is doubtful economy, even where the result seems to justify it, for in the end, the wastefulness of the method will make itself felt. Wherever Nature is left untrammelled by the farmer, she almost invariably produces a rotation of crops. Our artificial grasses soon cease to struggle with the natural ones; and even the latter succeed one another in almost regular order. In our Southern States, when the pine and other soft woods are cut off, the scrub oak and other hard woods succeed them, to give place in their time to softer ones. All have noticed in the Northern section of the Union, that when a forest of oak, hickory, or other hard wood, is cleared off, it is generally followed by a growth of soft wood.

No two varieties of crops extract their food in the same proportion. JOHNSTON gives the following table, showing the amount of salts extracted by a crop of turnips, growing five tons to the acre; of barley, 38 bushels; one ton each of dry clover or rye grass; and of wheat 25 bushels.

	Turnip Roots.....	BARLEY.		Red Clover.	Rye Grass.	WHEAT.		Total.....
		Grain.	Straw.			Grain.	Straw.	
Potash.....	145.5	5.6	4.5	45.0	28.5	3.3	0.6	233.0
Soda	61.3	5.8	1.1	12.0	9.0	3.5	0.9	90.6
Lime	19.8	2.1	12.9	65.0	16.5	1.5	7.2	149.0
Magnesia.	15.5	3.6	1.8	7.5	2.0	1.5	1.0	32.9
Alumina..	2.2	0.5	3.4	0.3	0.8	0.4	2.7	10.3
Silica	23.6	23.6	90.0	8.0	62.0	6.0	86.0	293.2
Sul. Acid.	49.0	1.2	2.8	10.0	8.0	0.8	1.0	72.8
Phos. "	22.4	4.2	3.7	15.0	0.6	0.6	5.0	51.5
Chlorine..	14.5	0.4	1.5	8.0	0.1	0.2	0.9	25.6
								970.9*

It is necessary that each plant shall find these salts in the soil, in quantities and conditions adapted to its use; rotation effects this end.

"Not every soil each grateful gift supplies;
Here waving corn—there happier vineyards rise,"

A planter near Jacksonville, Florida, had kept one hundred and ninety-five acres of rich land under continual cultivation of corn and cotton, for a period of nearly fifty years, until they were completely worn out by the meager rotation—being incapable of producing five bushels of corn or fifty pounds of seed cotton

* CUTHBERT JOHNSTON'S Chemistry.

per acre. He planted it to cane, and produced twenty-five hogsheds of very superior sugar, averaging one thousand pounds, from the one hundred and ninety-five acres.

GEORGE SINCLAIR took the following view of the cause of the exhaustion of soils: "If," he says, "a plant impoverishes a soil in proportion to the weight of vegetable matter it produces on a given space of ground, the following will be the order in which the under-mentioned plants exhaust the ground, being the proportion they bear to each other with respect to weight of produce:

Mangel wurzel.....	25
Cabbages.....	25
White turnip.....	16
Potatoes.....	15
Kohl-rabi bulk-stalked cabbage.....	14
Swedish turnip.....	13
Carrots.....	11

"But when we take the weight of nutritive matter which a plant affords from a given space of ground, the results are very different, and will be found to agree with the daily experience in the garden and the farm.

"The following figures represent the proportion in which they stand to each other with respect to the weight of nutritive matter per acre, and in exhausting the land:

Potatoes.....	63
Cabbages.....	42
Mangel wurzel.....	25
Carrots.....	24
Kohl-rabi.....	17
Swedish turnip.....	16
Common turnip.....	14

"Change of crops also suppresses weeds, and prevents very materially the increase of the predatory grub and insects which also more or less prey upon the farmer's crops."

The German farmers pay much more attention to a systematic rotation of crops than has been customary in this country. On this point, JOHN H. KLIPPART, Secretary of the Ohio Agricultural Society, recently said, in an address in that State: "In Europe there is a regular rotation of crops adapted to the soil—a three course system, a four course system, a six, eight, ten or twelve course system—according to the size of the farm and quality of the soil. The farm is divided into as many fields as there are rotations in the course, or else into multiples of the rotations; then, the kind of crop which was grown in field No. 1 last year, is grown in field No. 2 this year, and will be grown in field No. 3 next year, and so on till the course is completed; this insures a crop of wheat every year on a different field, and has many advantages; it has the advantage of having the soil properly prepared by previous

crops; it is very much less liable to insect depredations, and the crop is every year on a comparatively new soil, and there is, as a rule, a good wheat crop every year."

TUCKER'S *Rural Affairs*, for 1868, proposes a similar methodical practice for this country. "The following simple three and four course systems may be adopted in grain growing districts:

"Three-course system—First year, corn and roots, well manured; second year, wheat; third year, clover one or more years, according to fertility and amount of manure at hand. Early corn should be planted to admit of early removal for sowing the wheat.

"Four-course system—First year, corn and roots with all the manure; second year, barley or peas, or both; third year, wheat; fourth year, clover, one or more years.

"Oats is a severe crop anywhere in a rotation, but may be admitted on strong soils, the second year, if followed with fine manure. An experienced farmer, who adopts the preceding three-course system, never permits oats to grow on land fit for wheat, but confines the crop exclusively to the more moist parts of his farm, otherwise devoted to meadow and pasture.

"The following course occupies nine fields: First year, corn and roots with all the manure; second year, barley; third year, wheat seeded with clover; fourth year, pasture; fifth year, meadow; sixth year, fallow; seventh year, wheat; eighth year, oats or barley with clover; ninth year, pasture or meadow.

"A rotation used by some good farmers in Maryland is this: First year, corn with manure; second year, oats with one hundred and fifty pounds of guano, and buckwheat turned under as manure; third year, wheat, clover and timothy; fourth year, meadow; fifth year, pasture; sixth year, buckwheat, root crops, and peas.

"The rotation below is well adapted to stony soils when the dairy is a prominent business: First year, after fall plowing, sow in Spring oats; second year, after fall plowing, plant corn in Spring, applying a compost of muck, manure, and ashes, and top-dressing with plaster; third year, after fall plowing, sow early in Spring to wheat, barley, or a thinly seeded crop of oats, seeding down to clover and timothy, and top-dressing with one bushel of plaster to the acre; fourth, let the land lie in grass as long as it produces well, with the help of plaster and a triennial dressing in Autumn.

"The following course is used where little

else than the dairy is depended on for profit, the wheat or flour being purchased: First year, corn or sward with manure from barn-yard (applied and spread in Autumn or during Winter), and one bushel of plaster to the acre, putting the old or composted manure and plaster in the hills; second year, sow barley, Spring wheat or a thinly seeded crop of oats, with timothy and clover; third, pasture or mow five or six years, and top-dress with manure in Autumn. The grass seed should be sown at the rate of about half a bushel per acre, that the pasture may be fine and rich like old fields."

The following diagram exhibits, to such as may not be familiar with the subject, the manner of laying out a farm with fields, each being allotted to its regular course, with the following rotation in each field for the six years. Wheat, corn, and roots, barley, wheat, clover, grass:

No. 1.	No. 2.	No. 3.
1865—Wheat. 1866—Corn and roots. 1867—Barley. 1868—Wheat. 1869—Clover. 1870—Grass.	1865—Corn and roots. 1866—Barley. 1867—Wheat. 1868—Clover. 1869—Grass. 1870—Wheat.	1865—Barley. 1866—Wheat. 1867—Clover. 1868—Grass. 1869—Wheat. 1870—Corn and roots.
LANE WITH GATE TO EACH FIELD		
No. 6.	No. 5.	No. 4.
1865—Grass. 1866—Wheat. 1867—Corn and roots. 1868—Barley. 1869—Wheat. 1870—Clover.	1865—Clover. 1866—Grass. 1867—Wheat. 1868—Corn and roots. 1869—Barley. 1870—Wheat.	1865—Wheat. 1866—Clover. 1867—Grass. 1868—Wheat. 1869—Corn and roots. 1870—Barley.

Of course the selection and arrangement of the best rotation must depend upon the climate, soil, size of farm, and local position (for a market.) It will be governed, also, by the circumstance whether the farmer chooses, or finds it for his interest, to devote his farm mainly, 1st, to stock for sale; 2d, to crops for sale; 3d, to mixed crops, partly for sale and partly for use; 4th, to dairying; or 5th, to wool. In a majority of instances, every farmer will find it to his interest to engage to some extent in each of the specialties, but if he is wise he will make some of them his main object, to which all of his farm work will be made to contribute. Having settled these preliminary questions, the farmer is prepared to consider the subject of rotation intelligently.

Rotation secures another important advantage; it enables the farmer to apply manures in advance to those sensitive crops which might be injured by a direct contact with it. Wheat is liable to mildew, rust, and an over-

growth of straw with a diminution of kernel, if manured heavily from the barn-yard; but who ever knew corn and most of the other hood crops to be overfed? By rotation the sensitive cereals can be safely fertilized by being placed in a soil whose richness has been modified by the grass seed of the previous season.

The following alternation of crops is found by some farmers to produce excellent results on a good medium loam:

First year—Corn on sod.

Second year—Barley, followed by clover, not cut nor pastured, but allowed to rot down.

Third year—Clover plowed under when full grown, and after pulverizing the top of the inverted sod with a two-horse cultivator, sowing with wheat.

Fourth year—Wheat.

Fifth year—Clover and timothy meadow.

Sixth year—Pasture.

It will be seen that only two tillage crops are allowed in succession, it being noticed that three always make the land "sleepy."

Farmers are often driven by necessity to the successive culture of those crops which will make the heaviest immediate cash returns, without much regard for the wear and tear of land. This will generally be found poor economy, and should be avoided where it can be. Even a narrow course of rotation between wheat and clover is a vast improvement on the old-fashioned way of wedding a crop to a field for the life-time of the owner.

"For thirty years," says a correspondent of the *Prairie Farmer*, "I have practiced a rotation in farming, which to me is good. I put two years in grain, and two years in grass. My grass seed is mixed—two parts timothy and one part clover, and I sow one peck to the acre. This is a good proportion for both meadow and pasture; it will keep down the weeds better than any other course that I have seen or practiced. Turn over the sod at two years old; to lie longer, in some places, the grass gets out and weeds, or something else, gets in, to the injury of the other crops or working of the land. The second grain crop is the best time for the grass seed to grow, for then it has the full benefit of the decomposed sod. Corn is, I think, the best crop on the sod, where the land is suitable, for corn is more easily attended, and is less troubled with weeds; other crops are grown as circumstances direct.

"In the beginning of my experience in rotation, I tried with the two years' course one

field for fifteen years without manure; at the end of that time it was worth twice as much for farming purposes as when I began; and to-day I think as well of it, or better than ever. I keep as much stock as will eat up all the hay and pasture, and work up all the straw, and return the whole to the farm in manure."

We shall here take up the field crops separately, treating under an alphabetical arrangement, such as are exclusively or frequently grown in large quantities on the field.

Barley.—Barley seems to have been the earliest known of the cereals, and in Europe it ranks next to wheat in importance. In this country it yields precedence to corn, rye, and oats. The subjoined table, compiled by M. PAYEN, shows the proportions of the proximate principles of the cereal grains:

100 parts of	Starch.....	Gluten and other azotized matter.....	Dextrin, glucose, etc.....	Fatty matters.....	Celulose.....	Silica, phosphates of lime, magnesia, potash, soda, &c.....
Wheat.....	58.12	22.75	9.50	2.61	4.09	3.02
Rye.....	65.65	13.50	12.00	2.15	4.10	2.60
Barley.....	65.43	13.96	10.00	2.76	4.75	3.10
Oats.....	60.51	14.39	9.25	5.50	7.06	3.25
Maize.....	67.55	12.50	4.00	8.80	5.90	1.25
Rice.....	89.15	7.05	1.00	.80	3.09	.90

It appears that barley is much less valuable than wheat, containing more starch and less gluten. It ranks nearly the same as rye, as food for man. The following indicates the price of the cereals at Chicago at the times mentioned, and may serve as an approximate answer to the inquiry, "Is barley a profitable crop?"

Wheat, September, 1863—4, \$1 08 to \$2 05; corn, \$0 76 to \$1 30; oats, \$0 54 to \$0 84; rye, \$0 82 to \$1 50; barley, \$1 17 to \$1 40.

The extraordinary demand for barley, for malting purposes, which has sprung up since 1850, and which continues to increase, renders its more general cultivation inevitable. The rapid growth in its production in the United States is shown by the following statement: There were raised in 1840, 4,038,315 bushels; 1850, 5,109,054 bushels; 1860, 15,433,297 bushels; 1863, 17,754,351 bushels. The wheat crop increased 70 per cent. between 1850 and 1860; the barley crop, 300 per cent. The New England States produced of barley in 1850, 414,496 bushels—in 1860, 1,199,119; the Middle States,

in 1850, 3,758,011—in 1860, 4,763,469; the Southern States, in 1850, 56,132—in 1860, 219,930; the Western States, in 1850, 717,168—in 1860, 4,472,101; the Pacific States, in 1850, 11,516—in 1860, 4,462,376.

In California, barley supplies the place that is occupied by oats and corn in the States east of the Rocky Mountains; it is the principal feed grain. In 1866, California had 472,621 acres—one-fourth of all its cultivated land—in barley, producing more than eleven million bushels—as much as all the rest of the States. It grew only one-fifth as many bushels of oats and corn combined.

Barley is much more nutritious than oats, and is one of the very best articles for fattening swine, and forms excellent food for poultry. The green crop is much used in England as Spring pasturage for cows and sheep. It is a remarkably hardy plant, is subject to fewer diseases, and will stand, without serious injury, a longer drought than any other cereal. The soil best adapted to barley is a light sandy loam. To grow good crops the soil should be rich, and should be deeply plowed and completely pulverized by frequent harrowings and rollings.

In some sections of the country where wheat has failed, farmers have been led to the culture of barley as a sort of substitute therefor. It makes a fair quality of family flour, and hot barley cakes are very palatable. It is less liable to the attack of insects than wheat, and is regarded as a safe crop. Its average yield in Maine, where it is largely cultivated, is twenty-nine bushels to the acre, and forty bushels are counted upon in good seasons, where the crop is sowed in drills.

Beans.—Beans are principally raised for human food, though there is hardly anything equal to bean-meal as food for hard-worked horses and fattening swine and cattle. The United States Census Statistics, for 1860, give 15,061,995 bushels as our annual product of beans and peas, or nearly a half bushel to each inhabitant.

Beans as a field crop are quite profitable. They can be grown on very poor, light lands, but the yield will be small in comparison with crops grown on good soil. Some have the impression that only poor soils are adapted to beans, but they thrive best on strong, rich soil, and under good cultivation make a much more remunerative crop than is generally supposed.

The bean contains more nutritive matter than most other vegetables. From the analysis by Sir H. DAVY, more than half its weight consists of principles fit for nutriment. Ripe beans contain, according to EINHOF, eighty-four per cent. of nutritive matter, of which fifty is pure farina, the rest chiefly gluten and mucilage.

The field culture of bush beans is extensively practiced in nearly every State in the Union, with varying success. On proper soil, few crops give more lucrative returns. In former years beans were profitably raised at one dollar per bushel; they now command as high as \$2 50 for extras, and were much higher during the late war. It is believed that the cost of raising a bushel of beans is but a trifle more than that of potatoes, and only about double that of oats.

Preparation of Soil.—The *Agriculturist* gives the following directions for the culture of white beans: If the soil be light, plow it when the apple trees are in blossom, and in about two weeks afterward harrow thoroughly and put in the seed. If the soil be rather heavy, plow it twice, once at the time mentioned, and again two weeks after. Harrow and roll, if there are lumps, and put in the seed as soon as practicable after harrowing. Beans, as well as other seed, will vegetate much sooner in fresh soil, than when it has been plowed several days. If the ground be in sod, and a light open soil, plow with a flat furrow slice, harrow, plant, and roll. By putting off the planting in wet ground until it has become warm, settled, and dry enough to pulverize well, the beans will vegetate in a short time; get the start of the weeds, and thus save much labor in hoeing.

Planting.—There are several ways of planting beans. One is to plant in hills, about two feet apart each way. Another is in hills with rows only one way. Still another is to put in the seeds with a single drill, or scatter the beans along in a shallow furrow, a few inches apart. The most expeditious way of planting is, to put them in with a two-horse grain drill, adjusting it so that every third tube or tooth will plant a row. By this arrangement the rows will be about two feet apart, which will allow a horse and cultivator to pass between them. The drill should be adjusted to scatter the beans about two inches apart. A greater crop can be procured in this way than to plant in hills, because the seed is distributed more evenly over the entire ground. There is nothing gained by planting beans too thickly, as

four or five stalks in a hill will yield a maximum product. The quantity of seed per acre will depend entirely on the size of the beans, and the distance apart—usually from two four bushels per acre.

Harvesting.—The back-aching operation of pulling is now obviated by a handy little machine, called the bean harvester. It is worked by horse, and pulls the plants, delivering them in a row with the roots all one way in good order. If the weather is dry they need not be moved until time to draw them in, but if the weather is damp they should be stacked loosely around poles and covered with straw to shed rain. It will be better to avoid stacking if possible, since in the operation there is apt to be loss from shelling.

What is the Best Kind?—In this matter the reader is respectfully invited to make his own selection, as the field of choice is wide. FEARING BURR, in his *Field and Garden Vegetables of America*, specifies and describes one hundred and fifty varieties of beans. The white marrow is generally preferred; and for family use is probably the best. It is a handsome, roundish, white bean, cooks in much less time than the other varieties, sells higher, and yields good crops in favorable seasons. The blue-pod is better, or rather preferred for shipping long distances; being firmer, sells more readily, and is some ten days or more earlier than the marrow; a material advantage for escaping early frosts, or when the crop is to be followed by Winter grain, for which the ground is admirably fitted. On poorish land, the smaller varieties yield the best; shell the worst in gathering, and the best in threshing. The marrows have larger vines with fewer stalks; pull easier, and come up ready to hoe some days earlier than the others, which is a material advantage in weedy land.

Beets.—BURR describes sixty varieties of beet raised in America, but most of these are confined to garden culture.

Mangel Wurzel.—This is a red beet, and according to VON THAER, is a mongrel between the red and white beet. It has been long cultivated in France, Germany, and Switzerland, partly as food for cattle, and partly to be used in distillation, and in the extraction of sugar. It has been largely introduced into America, and is much esteemed for its strong nutritive qualities. The following is the analysis of Sir H. DAVY:

Roots.	Quan. of Nutritive Matter in 1,000 parts.				
Species.	Moisture or Starch	Starch or Sugar	Gluten or Albumen	Extract	Total nutritive matter
Swedish turnip.....	9	51	2	2	64
White turnip.....	7	34	1	.....	42
Mangel wurzel.....	13	119	4	.....	136
Orange-globe wurzel.....	23½	106½	1.20	less than 1	135
Sugar beet.....	17½	120½	1½	1	140

By this table it is apparent that equal quantities of Swedish turnip and orange-globe mangel wurzel contain very different proportions of nutritive matter, the latter more than doubling the former in quantity; and should the mangel wurzel be of equally easy culture with the Swedish turnip, it seems almost unaccountable that it should not generally supersede it in the fields. Mangel wurzel may be grown on stiffer soils than those adapted for the turnip, and it is better food for milch cows, as it does not, like turnips, give to the milk a taint. It can not bear the cold, however, so well as the Swedish turnip.

The mangel wurzel is a great lover of rich land, and the more manure the larger the crop. It also should have a finely pulverized bed—this is essential to a heavy yield. To plow and harrow twice before sowing will pay the extra expense; and the tilth can scarcely be too deep. The mangel wurzel should be harvested when frosty nights arrive, as the freezing of the tops injures their value for feeding purposes; besides, the men can then remain in the field in pulling the roots. The tops at that time are invaluable to feed to milch cows when the pastures are failing, and the cows need to be kept with a full flow of milk and not allowed on the mowing fields, thereby saving all the manure and getting more milk. If planted early the mangel wurzel escapes the insects which are so fatal to all the turnip tribe.

Yield.—This root yields tremendously. In 1866, Mr. PAYSON, manager of the farm belonging to the city of Boston, raised an acre of mangels, "which produced *seventy-three tons*, carefully weighed (two thousand four hundred bushels), besides five tons of tops (estimated)". This acre had been planted with potatoes in 1863; carrots in 1864, and onions in 1865. The manure each previous year had been twenty cords of sea kelp and stable manure. In the fall of 1865 it was heavily coated with sea-weed, and the weed plowed in, reseeded in spring of 1866, and the seed sown in drills

thirty inches apart. Dr. GEORGE B. LORING, of Salem, Massachusetts, raised on one acre and one-eighth, at a cost of \$135, including every expense, one thousand eight hundred bushels of mangels—red and yellow globe—the crop thus costing seven cents and a half a bushel. According to analysis and experience, four hundred pounds of mangels are equal to one hundred pounds of good hay. Mr. PAYSON's crop was thus equal to more than *thirteen tons* of hay—a quantity which it would take several acres to produce.

WILLIAM BIRNIE, of Springfield, Massachusetts, raised in 1859, on two acres and a half of land, three thousand one hundred and sixty-six bushels, or ninety-five tons, of mangel wurzels. The cost of growing and harvesting these was six and a half cents per bushel when stored in the cellar, according to a strict and accurate account kept of labor, fertilizers, etc. There were twelve hundred and sixty-six bushels, or thirty-eight tons, to the acre, equal certainly to nine and a half tons of hay. What other crop is there that from an acre will produce such an amount of nutritious and valuable food with so reasonable an outlay?

These are extra crops, which all farmers may not hope to rival; but any man, with careful culture, on good soil, may rely on a thousand bushels to the acre. Every man who keeps a cow should mark off in his garden a space six rods long and half a rod wide, and raise upon it forty bushels mangels.

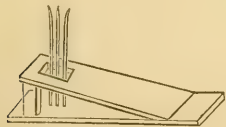
Sugar Beets.—Some prefer these to mangels. It will be seen, in the table already given, that the sugar beet contains nine per cent. more nutritive and fat-producing matter than any other beet or turnip, and it is regarded as more palatable to cattle. The sugar beet is much more highly prized in Europe than in this country, and is a great favorite with dairymen. There is no doubt that for feeding purposes it is the best of the beet variety; though its average yield is only about three-fourths as great as the mangels. It needs the same kind of treatment, is sowed in the same manner, and harvested about the same time.

Broom-Corn.—This is a native of America, of the Sorghum genus, and is scarcely a product of any other country.* It grows perfectly straight to the height of eight to twelve feet, flowering at the top in a cluster of long,

*Great Britain still uses for brooms the bundles of twigs from the yellow-flowered shrub that grows on the heath.

graceful panicles, crowned with abundant seed. It requires about the same soil and general treatment as Indian corn—plenty of manure and attentive culture. If too many plants appear, they must be thinned so as to insure the free growth of eight healthy stalks. There are several varieties. The North river kind makes ordinarily the best crop; it is ten days earlier than the large kind, and yields about seven hundred and twenty pounds of the brush per acre—the brush, meaning the dried panicles, cleaned of the seed, with eight or twelve inches of the stalk. The New Jersey, or large kind, yields a thousand or eleven hundred pounds of brush per acre. The stalks and seed are large. In good seasons, this is the most profitable crop. The average crop at the West is four hundred pounds to the acre. The price of broom-corn varies materially, ranging from five to fifteen cents a pound.

Cleaning the Brush.—This is done by drawing the dried brush through a hetchel. The following simple form is much used. The operator stands at the end A.



The lower plank may rest on the barn floor, or have short legs. The upper oblique has a hole, through which the scraper passes, and down which the seed may fall. Each side of the instrument a wedge may be inserted, to regulate its elasticity, or by some other contrivance this object may be secured. In scraping, the panicles must first be laid evenly together, and the stalks taken in the hand.

This machine is not expensive; but a still cheaper one can be obtained at any country store, by investing twenty-five to fifty cents. It is simply a common curry-comb. Hold the brush on a board with one hand and scratch off the seed with the other. It will be found to work pretty well.

Culture.—The broom-corn may be hoed three or four times profitably. As soon as the seed is formed, a man should pass between all the rows, and break the stalk a foot below the brush, so as to leave the brush suspended seed downward. When nearly ripe, cut the stalk eight or ten inches from the brush, and carry

under cover to dry by spreading on slats. Never dry in the sun. The tall remnant of stalk should always be plowed under.

J. M. BROWDER, of Cedarville, O., writes to the *Cincinnati Gazette*, March, 1869, urging the theory that the brush for brooms should be cut *when it is green*, wilted in the sun, and cured in the shade. He says: "Broom-corn, ripe, is red, harsh and rough; green brush is pliable and elastic—about one-half as hard on a carpet as the red is, and *will last more than twice as long*. The green brush is worth more than double as much as red brush, and weighs more to the bulk. I have tested all stages, from the time of bloom to dead ripe. I find the brush most elastic and tough when cut just as the water begins to thicken in the grain. The market price here of brooms made of red brush, is \$3 25 per dozen; green brooms, \$4 to \$5 per dozen."

Yield.—L. G. THOMAS, of Lone Rock, Wisconsin, sent to the *Farmer*, in 1865, the result of a seven years' experience, as follows: "Have raised from five to thirty acres per year on light sand, and get five hundred to six hundred pounds per acre, and manufacture all into brooms. One and a half pounds clean brush is required per broom. Hence an acre makes thirty dozen brooms. Prior to the rise in gold, sold them on an average at \$2 per dozen. The same quality now brings \$4 to \$4 50. The seed, per acre, averages twenty-five to thirty-five bushels, and weighs, when clean, forty-five to fifty pounds, and is now worth, to feed, one cent per pound. Heavy, strong land, not liable to early frost, will produce one-third to one-half more. In my opinion, eight hundred pounds is the extreme in this State. The value of broom brush, as quoted by the *Chicago Tribune* in that city, is \$250 to \$325 per ton—the highest price ever known there. It usually brings \$100 to \$150 per ton." Any farmer can easily learn to make up his own brush into good marketable cord or wire brooms.

Buckwheat.—This is a native of Northern Asia, and is not a cereal, though, for convenience, classed among them. We have already treated of its excellent properties as a green manure. For its value as grain, there were 21,359,000 acres raised in the United States in 1857, at a total valuation of about \$25,000,000. It thrives best on light soils or sandy loams, but they should be tolerably fertile to secure a remunerative harvest. Fresh manure injures the plant.

Thorough pulverization should precede culture, in order to a seasonable ripening. Buckwheat should be sown when chestnut trees are in full blossom—about the 1st to the 6th of July in the latitude of Central New York, so that the hottest weather will have passed by the time the buckwheat is in full bloom. Cool weather, or at least cool nights, are quite as essential to a good fructification of buckwheat, as hot days and nights are to Indian corn. The point to be aimed at in every locality, is to defer sowing as long as possible and allow it sufficient time to mature before an early frost will destroy the crop.

When, perhaps, one-half of the seeds are turned brown, the grain should be cut, in the dew, and as the straw is very succulent and juicy, the unripened grain will draw nourishment from the stock, and will fill out and ripen very well after it is cut. The common way of treating buckwheat effectually prevents making good flour, it being allowed to remain in the swath for several weeks, when it should never be suffered to lie longer than a day or two, and it is decidedly better for the grain to rake it and set it on end, as fast as it is cradled. Much less grain will be wasted by shelling out; the straw will cure and dry out sooner, and make better fodder; the crop will be ready for threshing or housing in less time, and the grain will yield a much better quality of flour.

To subdue a bush pasture, that it is desired to break up, or land that has become foul with thistles, rushes, etc., this is an excellent crop. It grows very rapidly, spreading its branches, takes the lead of all other plants, overshadowing them, and by keeping them in the shade often subdues them, as well as by keeping the roots and sods moist, which causes a rapid decomposition. As a renovating crop buckwheat has no equal.

The grain is not only widely used as a flour for one of the most savory of breakfast dishes, but serves an excellent purpose as food for horses, hogs, and poultry. The flowers are very attractive to bees. "Sheep will feed and thrive as well on the straw as on good hay," and it is very easily threshed. The popular whimsey that buckwheat is exhausting, and injures land, is not confirmed by experience in those cases where the cultivator returns to the soil as much of the straw as possible.

According to the analysis of the grain we find it composed of—water, 14.0; flesh-formers,

9.0; fat-formers, 52.1; accessories, 23.3; mineral matters, 1.6, showing it to be a valuable grain for fattening purposes. Compared with other food for man, it is easily digestible, but the popular method of serving it up in *hot cakes* is responsible for much of the national dyspepsia.

Cabbage.—BURR enumerates some seventy varieties of the cabbage grown in America.

Its Value for Food.—It has more than ten per cent. of fat and flesh-forming elements, and is very succulent. The relative value of cabbages, as compared with other vegetable food, is shown by Professor JOHNSTON in his *Agricultural Chemistry*, where he says: "In the case of the ox the daily waste or loss of muscle or tissue requires that he should consume twenty to twenty-four ounces of gluten or albumen, which will be supplied by any of the following weights of vegetable food:

	Pounds.		Pounds.
Meadow hay.....	20	Cabbage.....	70
Clover hay.....	16	Wheat.....	11
Oat straw.....	110	Potatoes.....	60
Pea straw.....	12	Carrots.....	70
Oil cake.....	4	Beans and Peas....	6
Turnips.....	120		

From this table it appears that cabbages are worth as much, pound per pound, as carrots, and nearly twice as much as turnips. This is more than the popular estimate, but is, no doubt, correct. Cabbages are much grown as a food for stock. One of the commonest objections urged is that they are deteriorating and often fatal to the health of the animal. This result is always attributable to carelessness in overfeeding. Animals incline to eat voraciously of green succulent vegetables, which are intended to be fed sparingly, mainly as an appetizer, and to keep the system in tone.

Profitableness as a Crop.—The great cabbage growers about New York city sometimes calculate upon ten thousand heads per acre, allowing four superficial feet to each plant, which gives a surplus of three thousand for missing plants. We suppose the crop may average five cents a head, giving \$500 an acre, which, considering it is a second or third crop of the season, affords a pretty good return. In Essex county, Massachusetts, whole fields of mammoth drumhead have averaged thirty pounds per head, or more than a hundred tons to the acre! Cabbages often follow peas, with which radishes or lettuce has been grown; and the ground from which an early crop of potatoes has been taken is often planted with late

cabbages. In New Jersey, upward of twenty thousand, by one grower, were raised on four acres, and sold for about \$1,500. More than forty thousand were obtained by another successful grower from about eleven acres, which returned a gross sum of nearly \$3,300; and a third, produced, on thirty acres, one hundred and seventy-five thousand, which were sold for \$9,000. But the yield and year were both exceptional. The cabbage is capricious in its growth. Sometimes, because of defective seed, injudicious culture, or an unfavorable season, whole fields refuse to head.

Varieties.—There are a great number of varieties of cabbages, many of which are inferior. The Winningstadt is placed among the first for excellence. It is a choice variety for the table, and taking all its good qualities into account, is scarcely excelled. The Wakefield, the Ox-heart, the Drumheads, the Red-Dutch, the Early York, the Bergen, the Stone-mason, and the Sugar-loaf are popular varieties, all of which make good returns. Some of the varieties of the Savoy are quite desirable for cooking. The leaves are much wrinkled, and the variety is very highly esteemed for its flavor and richness. A Massachusetts grower announces a new variety called the Cannon Ball. It is said to be very hard-headed and heavy for its size, being round like a cannon ball, and excelling in hardness every known variety.

Soil.—The soil can not easily be made too rich for cabbages. They can be grown on almost any soil that is adapted to corn if an abundance of well-rotted manure from the compost is applied to the land. That mainly from the hog-pens produces the best results. Cabbages are not likely to do so well on ground that has been successfully cropped by them for three or four years, but succeeds best on fresh lands. Planted in a hog-yard, or where manure long has lain, they yield enormous crops. The preparation of the ground where the best results are sought for, should not be inferior to that for the tobacco crop. It should include two plowings, with sufficient harrowing, to make the ground light and fine. If it is at all stiff and unyielding, fall plowing, like that recommended in the cultivation of onions, will be found very beneficial. One point of considerable importance is to have the last plowing immediately before the plants are set. Irrigation also helps cabbages greatly.

Raising and Sowing Seed.—BURN'S directions for obtaining seed are to select perfect heads and set them three feet apart each way. As

they grow, remove the side shoots and encourage the main sprout, which will push up through the center of the head. Seed thus cultivated for a few successive years will produce plants, ninety per cent, of which will yield well-formed and good-sized cabbages. In sowing seed for plants it is always well to sow plentifully in order to secure enough plants to meet every emergency. Having selected a suitable seed-bed, which should be fine and rich, prepare it well by plowing or digging and raking; sow the seed, about the middle or last of May, in drills about a foot apart, and roll or spot the ground smoothly, so that there shall be no lumps for insects to secrete themselves under. The great care at this period will be to have a bed rich enough to give the plants a good start, to have moisture enough to induce an even and quick germination of the seed, and to ward off, if possible, the depredations of the turnip fly.

Transplanting.—Transplant into rows two feet apart, and eighteen inches apart in the row, give the plants a copious watering the evening previous to taking up, and water again after setting out. The whole secret of their after culture lies in deep hoeing. Hoe while the dew is on, if practicable.

Insects.—The first insect to whose ravages the cabbage is subject, is the fly or black bug, already mentioned. The following are named among the preventives: 1. "Steep the seed in a pint of warm water two hours, in which is infused an ounce of saltpeter; dry it, add currier's oil enough to moisten the whole, after which mix with plaster enough to separate it, and fit it for sowing." 2. "After preparing the ground in the usual way for the seed-bed, cover it up thickly with almost any kind of combustible rubbish; burn this to ashes, and rake the ground and sow the seed, and no insects will attack it while the effects of the fire remain." 3. "Sprinkle black pepper and flour on the drills, while the dew is on, as soon as the plants can be seen."

Keeping in Winter.—Owing to their great bulk and liability to decay, it is a somewhat difficult matter to preserve cabbages in large quantities in our common cellars. One way is to hang them up by the roots; another is to thin off the outside leaves and stumps and pack in barrels; still another is to set them cut in the cellar, as thick as they can be made to stand. Where the object is to keep them in very large quantities over winter, pits are dug of the size neces-

sary to contain the required number, say a foot or eighteen inches deep; into these the cabbages are packed as tightly as possible, in an upright position, and over the whole enough litter is thrown to protect them from severe frost. A slight degree of frost does not injure them if they are kept at an even temperature. In addition to these methods, they are sometimes pitted by digging a trench in a dry place, wide enough to hold the heads, and about a foot deep. Into these trenches the cabbages are put, head downward, and covered with boards and earth or litter.

Carrot.—This is a valuable root, and is considerably grown in the field. Five or six hundred bushels to the acre is an average crop; a thousand bushels are often raised and twelve hundred sometimes. Twenty-five tons of carrots can be raised on one acre of good land, which are equal to more than eight tons of good hay. The value of carrots as a field-crop depends upon the locality, and upon the success of the farmer in getting his seed to germinate. They are generally regarded as the most unreliable crop a farmer can raise, but the failure is sometimes the result of improper culture. Their value for milch-cows is unsurpassed, producing a rich yellow cream; their weight per bushel is less at the time of harvesting than that of mangels; their shrinkage during the winter is greater, and they do not keep as long into warm weather as the mangels. They are valuable, however to keep the stock in spirits and health, and give them an appetite—in fact this is the chief benefit of all root crops.

Varieties.—Those sown in the fall are chiefly the Long Red, the Long Orange, and the White Belgian. The latter attains huge dimensions, but is inferior in quality to the Orange.

The best soil is a fertile sandy loam. Pulverize it thoroughly. Let it be plowed deep twice, or thrice, if it is not in sod. Then, about the twentieth of May, or the first of June, scarify the surface, for the purpose of exterminating the weeds. If the surface is at all lumpy, let the lumps be crushed with a roller. If the ground be in a poor state of fertility, a dressing of the pure superphosphate of lime, spread in a shallow drill on each side of the rows of carrots and raked in, will result profitably.

Preparation and Sowing of Seed.—As the Seeds are a long time germinating, they should be sprouted before they are planted, and this should be done early in May, in the latitude of New York. Soak the seed in warm water

(enough for two or three pounds to the acre), for twenty hours. Then mingle it with fine sand in a vessel that will not hold water. Keep the sand and seeds moist and warm. As soon as the seeds exhibit signs of germination, let them be sown with a drill in soil just stirred with some implement. In four or five days, if the soil be moist and warm, the carrots will appear above ground; and scarcely a weed will be seen among the young plants. Then the carrots will vegetate rapidly, and outgrow noxious weeds; and the labor of weeding the rows will be comparatively light. Unless the ground is rich and free from weeds, do not make the drills nearer than two feet, so that a horse-hoe may do almost the entire weeding.

Culture.—When the young plants are two or three inches high, let the thinning be performed with a sharp, broad hoe, worked across the drills, leaving three or four plants in a cluster. During wet and lowrey weather, when laborers can not work advantageously at other employment, let the smaller carrots be pulled up, leaving one in a place—about six or eight inches apart. Cultivators should be used which are adapted to the purpose, and if made so as to stretch over two or three or more rows at once, the labor would not only be cheapened, but the crop would be increased by the more frequent stirring of the soil, which would be sure to result from this increased facility for doing it.

Harvesting.—One method is to top them with a sharpened hoe, and then to run a subsoil plow directly by the side of the row of roots, which lifts them out of the ground about two inches; then with potato diggers, go along and rake them out, so as to lift them from the ground and throw them inward, leaving room for the team to go through. This should be done in the forenoon of a dry, sunshiny day; in the afternoon, pick them up, shake them, and cast them into the cellar. It is important that they go in as dry as possible.

Castor Bean.—This bean, from which castor-oil is expressed, is a native of the West Indies, where it is found in great abundance. Its cultivation as a field-crop is extensively carried on in our Middle and Western States, and is rapidly increasing. A single firm in St. Louis has worked up 18,500 bushels of beans in four months, producing 17,750 gallons of oil—sold at an average price of \$50 a barrel. The bean thrives best in a rich sandy loam, and is planted and cultivated in hills like corn. It grows up irregularly to about the same height

and bears twenty-five bushels to the acre, the seeds being inclosed in capsules. The oil is separated in two different ways: First, by boiling the bruised seeds inclosed in a bag, and skimming off the oil as it rises, and finally, pressing the bag. Second, by heating the seeds in iron trays slightly, so as not to char, pressing under a screw, collecting the oil, and boiling in water, taking care to separate all the white parts, and reserving the pure limpid oil only.

Corn.—Corn is the generic name by which wheat, barley, oats, etc., are designated in Europe; but in America it is exclusively used to refer to Indian corn, or maize. This is a native of our soil, and was first found by COLUMBUS, extensively cultivated by the savages of Hispaniola, now Hayti. He carried the tall ear-bearing stalks back with him among the trophies of his conquest. It was cultivated by the whites in Virginia in 1607, and by the Massachusetts Pilgrims soon after they took possession of the soil. It is still found growing in a wild state beyond the borders of settlement, almost the whole length of the continent, from New Mexico to Buenos Ayres. In Paraguay, each grain wears a separate husk of its own.

Its Value as Food.—Corn may justly be regarded as the national crop of the United States. Its money value is double that of hay, three-fold that of wheat, and five times that of cotton. In 1850, the amount of the corn crop was 591,630,564 bushels, and in 1860 it was 827,694,528 bushels—an increase of forty per cent., and twice as great as the aggregate bushels of wheat, rye, oats, barley, buckwheat, peas, and beans. Nearly all the beef, mutton, and pork in the North and West is fattened on Indian corn; and its abundance accounts for the relatively low price of provisions in this country, as contrasted with most other lands. While other substances contain more flesh-producing material, there is nothing which makes so much good, firm fat in so short a time.

Under the head of Barley we have already given a table that includes an analysis of corn, exhibiting in it an abundance of fat-forming principles, with a liberal supply of the nutritious. "The comparative value of maize with other foods, has been the object of much research by experimenters; the results have been unanimously in favor of this grain before all others used for fattening animals."*. In it

there is a natural coalescence of elementary principles which constitute the basis of organic life, that exist in no other vegetable production. In ultimate composition, in nutritious properties, in digestibility, and in its adaptation to the various necessities of animal life in the different climates of the earth, corn *real* is capable of supplying more of the absolute wants of the adult animal system than any other single substance in nature. [For conditions of feeding of corn see the subsequent article on Stock.]

As an article of every day consumption by man and beast, Indian corn is without a rival. Slowly, but certainly, it is forcing its way into common use in England, Scotland, and Ireland; and to this end its most economical production in this country is a matter of the highest importance.

Varieties.—There are, as already intimated, many varieties of Indian corn. The best kind, in any given case, depends much on the soil, climate, and uses for which it is designed. The yellow flint will probably remain the favorite in the Northern and Middle States, while the white dent seems best to answer the requirements of the South and Southwest. The dent corn contains less oil than the flint; the flint less than the little pop-corn. The oil in the yellow corn is a most valuable part of its composition, as it renders the grain harder and less liable to mold or spoil in very wet weather, or when stored in a corn-crib. The meal or flour made from yellow corn is also less liable to ferment and turn sour, and is more nutritious for fattening cattle, hogs, and poultry than the white, and nearly oilless varieties of Indian corn, though it is not so easily digestible by man.

The improved King Phillip is an excellent variety; ripens in a hundred days from planting, and will produce one-half more than the ordinary King Phillip. SOLON ROBINSON says it will not hybridize when planted near other corn. There are several hybrids of the Dutton corn which will ripen in seventy-five to ninety days. Sweet corn will pay as a field crop for feed, after the farmer has used and sold as much of it, in the green ear, as table and market require. Cattle and hogs are very fond of it, and it contains twice as much sugar as any other corn. The stalks and leaves are also sweeter than those of ordinary varieties.

Selecting Seed to Plant.—It is now well understood to be one of the essential points of respectable farming, to select from the matured

* U. S. Agricultural Rep., 1865.

crop, the largest, fairest, and *earliest ripened* ears, to keep as seed-corn for the ensuing year. In this practice experience abundantly justifies the suggestion of philosophy. In every State the most enterprising farmers have increased the yield and quality of their corn from five to fifty per cent., by the persevering exercise of a judicious selection, continued for a series of years.

The improved variety of Baden corn was produced in just this way. The propagator thus tells his story in the *New England Farmer*: "I have the pleasure to say that I have brought this corn to its high state of perfection by carefully selecting the best seed in the field for a long course of years, having especial reference to those stalks which produced the most ears. When the corn was husked, I made a re-selection, taking those ears only which appeared sound and fully ripe, having a regard to the deepest and best color, as well as to the size of the cob.

"In the Spring, before shelling the corn, I examined it again, and selected that which was the best in all respects. In shelling the corn, I omitted to take the irregular kernels at both the large and small ends. I have carefully followed this mode of selecting seed-corn for twenty-three years, and still continue to do so. When I first commenced it was with a common kind of corn, for there was no other in this part of the country. If any other person undertook the same experiment, I did not hear of it; I do not believe others exercised the patience to bring the experiment to the present state of perfection. At first I was troubled to find stalks with even two good ears on them; perhaps one good ear and one small one, or one good ear and a 'nubbin.' It was several years before I could discover much benefit resulting from my efforts; however, at length the quality and quantity began to improve, and the improvement was then very rapid.

"At present I do not pretend to lay up any seed, unless it comes from stalks which bear four, five, or six ears. I have seen stalks bearing eight ears. One of my neighbors informed me that he had a single stalk with ten perfect ears on it, and that he intended to send the same to the museum at Baltimore. In addition to the number of ears, and of course, the great increase in quantity unshelled, it may be mentioned that it yields much more than the common corn when shelled. Some gentlemen in whom I have full confidence, informed me that they shelled a barrel (ten bushels of ears)

of my kind of corn which measured a little more than six bushels. The common kind of corn will measure about five bushels only. I believe I raise double, or nearly so, to what I could with any other corn I have ever seen. I generally plant the corn about the 1st of May, and place the hills five feet apart each way, and have two stalks in a hill."

Ex-Governor F. HOLBROOK, of Vermont, testifies to a similar result, after twelve years experience.

The most careful farmers in the country are now uniform in their habit in this matter. They go through the field when the harvest is ripening—it is of prime importance to secure the seed-corn before the frost has touched it—and select those ears which ripen earliest and best, from stalks bearing two or more ears, well filled out over the end, seed set close together with no vacant places or openings between the rows, large kernels with small cobs. Leave two or three husks on each ear and braid them into strings of about two dozen each; hang them up in the attic of your buildings, where they will keep dry and not be disturbed and have a free circulation of air around. When wanted for use, break or chop off both the tip and butt end of the ears, using the middle portion only for seed.

Some experiments, however, do not seem to confirm the wisdom of the method indicated in the last sentence. In 1858 an experiment was instituted and carried through on the farm connected with the Reform School in Westborough, Massachusetts, in order to ascertain the facts in the case. An acre of land was planted with corn, in alternate rows, with seed taken from the butts, middle, and tips of the ears. The sound corn, soft corn, and stover of each were weighed, and in the report is a table of figures, showing the yield of each kind of seeds.

CHARLES L. FLINT, Secretary of the Board of Agriculture, gives the result: "On comparing the crops grown on this field, and estimating the sound corn and the stover at \$7 the ton, it will be found that the value of the crops produced by the rows planted with seed taken from the butts, was \$12 53. The value of the produce of the rows seeded from the tips of the ears was \$12 36—pretty near a draw game. The butts produced the most, the tips the next, and the middle the least money value; while the tips produced the most, the butts the next, and the middles the least sound corn; and the middles produced the most, the

butts the next, and the tips the least soft corn. It is difficult to determine by this experiment from what part of the ear the seed should be taken. Probably a mixture of the whole ear, being most natural, would be the best."

Another experimenter reports in the *New York Independent* that he tried an ear of corn to note the result. The butt, middle, and tip were planted in different rows, in the same garden, and subjected to the same treatment. "The large end produced fair sized ears, with irregular rows, much as you will find them at that end of the ear. The middle kernels produced large ears, mostly straight and fair. The tips brought forth nubbins only. There was not a fair ear on the two rows of corn, planted from the tip!" If the reader shall regard the mooted question to some extent undecided, he can join the experimenters and "try it."

In times of severe early frost, the corn is apt to be fatally frost-bitten, so that the succeeding crop will be a total or partial failure. There is no grain whose vegetative powers are so liable to injury as corn. A very slight freeze before the grain arrives at maturity in the field, a slight heating in the crib, or exposure to alternations of wet and frost, most effectually destroy its germ.

This is another reason why farmers should not rely upon their corn-crib for seed. "It is not safe," observes the *Iowa Homestead*, "to judge seed-corn alone by its external appearance. The only safe criterion to go by in selecting seed-corn, is the appearance of the chit. Every ear intended for seed should be broken near the center. When thus broken, if the skin of the chit is blistered or wrinkled, reject it. If the skin is smooth and clear, not discolored, not one kernel in a hundred will fail to grow."

Preparation of the Seed.—Judge JESSE BUEL gives the following advice: "The enemies to be combated are the wire worm, brown grub, birds, and squirrels. Of these, the first and last two prey upon the kernels, and against these, tar offers a complete protection. I soak my seed twelve hours in hot water, in which is dissolved a few ounces of crude saltpeter. When the corn has been thus soaked, I take for each half bushel of seed half a pint of tar, put it into an iron vessel with water, and heat it till the tar is dissolved, when it is turned upon the seed in steep. The mass is well stirred, the corn taken out, and as much plaster added as will adhere to the grain. This impregnates and

partially coats the seed with the tar. The experience of years will warrant me in confidently recommending this as a protection for the seed."

The seed so prepared should be planted immediately after it has undergone this protective preparation, since too much drying might injure it. JAMES C. TAYLOR, of New Jersey, thus writes: "I thoroughly tested the benefit of soaking seed-corn in saltpeter this year on a small piece of ground, planted late. I had not enough soaked to plant all the piece. Where it was not soaked the blackbirds pulled out about one-third; where it was soaked, they seldom touched a hill. But what was most peculiar, there happened to be one row planted with dry corn between two rows that were soaked; of the dry, they took several hills clean, and altogether, about one-third of the row; while they did not take more than one hill of the two saltpeter rows.

The *Practical Farmer* says that a table-spoonful of coarse salt dropped on each hill of corn, soon after planting, is far better to keep off cut worms than soaking the corn in gas tar. The salt is carried down by the rains, and acts as a fertilizer, besides destroying the worm.

An Indian says that hanging seed-corn in a smoke-house, and leaving it there, while the meat is being smoked, will keep moles and field-mice from eating it after it is planted.

Some agricultural chemists who have experimented, insist that farmers would derive great benefit from fertilizing their seed-corn, by soaking in some solution that will forward germination. Dr. CHAMBERLAIN, of Chicago, set four boxes in his office for experiment, and in these he planted, at the same hour, kernels of corn differently prepared; he examined them afterward with the following result: In the first, the seeds that had not been soaked had not germinated; in the second, the seeds soaked in warm water had just begun to germinate; in the third, the seeds soaked in a solution of chloride of lime, showed blades just breaking through the soil; in the fourth, seeds soaked in a solution of chloride of lime and copperas, had sent green blades three inches above the ground. If a month, or even a week can thus be saved, it will prove a most valuable discovery. The solution tends to protect the seeds from birds and worms, and enough of it can be bought for a dollar to soak the seed-corn of a hundred acres.

Soil.—The best soils for a growth of corn are such as contain a deep, rich, warm, mellow,

and porous ground, fully permeable to the air, heat, and moisture. In such soils the growing corn can extend its roots freely both in depth and sideways, as corn must do to yield large and fine crops; and as our river bottoms and sandy and loamy grounds possess these properties in the highest degree, they are everywhere regarded as our best corn soils. The lowlands or bottoms usually produce the largest stalks and ears, and the uplands or higher grounds have the heaviest grains. Corn planted upon stiff clays and hard gravelly grounds is very likely to prove poor or a total failure, because such soils are so tough and compact as to exclude the air, heat, and moisture, and hence are destitute of the necessary porousness and warmth. Corn is, indeed, a very hardy plant, and will grow almost anywhere, but it will yield the most profitable crops on soils that are deep, rich, mellow, and warm. The ground can scarcely be too rich for corn, for it is a very gross feeder. A clover lay, or thick grassy mold, furnishes an excellent base.

Preparation of Soil.—If the ground intended for a crop of corn is a clover or grass lay, it is generally plowed *but once*, early in the Spring, or just before planting time, if the soil is naturally a loose and mellow one; but if the soil is hard and tough, it is customary to plow the ground *twice*, once in the Summer or fall, or Winter, if possible, and just deep enough to cover the sod properly, say from three to five inches deep, as that depth will hasten the decomposition of the clover or grass more rapidly than deeper plowing, and then *cross-plow* the whole again in the ensuing Spring as deeply as desired. Late fall or Winter plowing of grass and clover grounds for corn has many advantages to recommend it; it exposes the cut worm, heart worm, and wire worm, in their embryo state, to the action of the frosts, and thus destroys them; the grass or clover then plowed down becomes rotten so much earlier than it would under Spring plowing, that it enriches the soil and makes it mellow, and so more easily tillable in the ensuing Spring, while at the same time it greatly increases its moisture and productive power, and so secures a good crop of corn in times of severe Summer drought.

"Where there is a sod," says Judge BUEL, "the rows should be superficially marked, and the seed planted upon the surface. Where the field is flat, or the subsoil retentive of moisture, the land should be laid in ridges, that the excess of water which falls may pass off in the furrows." Corn ground can scarcely be plowed

too deep. The plant sometimes shoots into the earth to the depth of three feet; the root sends its feeding branches abroad as the stalk does its leaves. Deep plowing is on the increase; farmers are discovering that where there has been deep plowing, crops will stand the drought, and that they can cultivate more land by working vertically, without investing in any more acres.

Planting.—The time of planting depends on location and seasons. The ground should be sufficiently warmed by vernal heat to cause a speedy germination. Natural vegetation affords the best guide. Judge BUEL used to say, corn should be planted "when the apple is bursting its blossom buds." This, in the Southern States, is from the first of February to the first of May; and in the Middle and Western States, from the middle of April to the first of June. Poor, cold soil should be planted earliest, and have careful cultivation. Deep warm soils ought not to be planted in our Western States till some time in May. The number of grains should be about five to the hill, viz:

"One for the blackbird, one for the crow,
One for the cut worm, and two to grow."

Three grains are enough to grow if the hills are three or four feet apart, and two if nearer. The old Indian fashion of *hilling* corn is rapidly passing away, to be retained only on wet land, and even there, draining should be substituted for it. Constructing large conical hills on land which is light and dry, must inevitably tend to increase the effects of drought, inasmuch as it exposes more surface to the atmosphere, and consequently increases aerification at times when all the moisture contained in the soil is required for the support and sustenance of the plants. When rain falls, the conical hill conducts the water from the roots to the center of space between the rows and hills, very little of the fluid being retained about the plants, or within range of the small roots, by which the *pabulum* is taken up by the growing plants, and without which they would immediately languish and decay. On light soils, hilling is always disadvantageous to the crop. Every fresh stratum of earth placed over the roots causes a protrusion of a new set of laterals, to the detriment of those previously formed. This exhausts the energy of the plant, without increasing, in any degree, its powers of appropriating food from the surrounding soil.

WILLIAM H. WHITE, of South Windsor, Connecticut, an excellent authority in such

matters, favors rectangular or quincunx planting, as it will admit of cross cultivation, and sets both the rows and hills three and a half feet apart. Strong, rich, soils, like the deep mold of the West, will bear much thicker planting than weak soils, and dense culture has an additional advantage of shading the ground and retarding the growth of weeds. But too close on any soil will result in a crop of fodder instead of corn.

Many of our best farmers have been convinced of the superiority of planting corn in drills three feet apart, the seeds being covered twelve to twenty inches apart, one or two grains in a place. JOHN JOHNSTON says that this results, in a majority of cases, in an increase of twenty-five per cent. J. W. CLARKE, of Green Lake county, Wisconsin, expresses his opinion in the *Prairie Farmer*, that separate distribution of the seed in planting is as really essential to growing large crops of corn as in growing large cabbages, or fine, thrifty trees, and for the same reason, namely—that of preventing a double or quadruple demand for the same space to grow in, and the same elements of growth by two to four plants bunched together, and each plant requiring the same identical space and feed. The elements of growth being distributed all through the surface soil, the plants should stand where their seed is, instead of growing their passage to it; or, in other words, the distribution of the plants should be such that they can absorb nutrition from the whole surface mold, making the entire soil of the ground contribute to the growth of the crop, as far as compatible with thorough and frequent cultivation.

The depth at which corn should be planted necessarily varies from one to six inches, according to the nature of the soil, for it ought on every soil to be planted just deep enough, whatever that depth may be, to keep the seed moist and insure its germination and prevent the growing plant from shriveling or drying up. "A deep covering of the seed will prevent it from rotting if planted early and the ground should continue wet and cold, while in a very dry season the seed will sprout and grow the better for it, as it will have more moisture than if planted shallow. The cut worm, also, in such cases will not go deep enough into the soil to reach and destroy the heart of the seed, and hence all the injury it can do *above* the seed will not be so serious as if it reached the heart or bud itself."²

Several experiments have been made in order to ascertain the proper depth at which to plant corn, and by one of them it was discovered that when it was planted three inches deep, it came up and grew well until it was three or four inches high, and then stopped for a fortnight, while the corn in the same field which was planted at a less depth, grew rapidly. On examination it was found that a joint had been formed about one inch and a half above the kernel, and that the roots had sprouted out from that joint, leaving all below to perish. While the process of changing roots was going on, the plants ceased to grow above ground, but in about a fortnight recovered their vigor, and they were about that length of time later in maturing the grain than the seeds which were planted shallower.

A series of careful experiments by one man showed that corn planted at the following depth came up as described:

No.	1	1	inch came up in	8	days.
"	2	1½	" " "	9½	"
"	3	2	" " "	10	"
"	4	2½	" " "	11½	"
"	5	3	" " "	12	"
"	6	3½	" " "	13	"
"	7	4	" " "	13½	"
"	8	4½	" " "	14	"
"	9	5	" " "	15	"
"	10	5½	" " "	17½	"
"	11	6	" " "	—	"

Nos. 8, 9, and 11 were dug up after twenty-two days, when it was found that No. 8 had an inch more to grow to reach the surface. Nos. 9 and 11 were three inches beneath the surface. No. 10 came up in seventeen and a half days, but withered after six days' growth. The more shallow the seed was covered, the more rapidly the sprout made its appearance, and the stronger was the stalk. Farmers should bear this in mind lest they should be induced to plant their corn *too deep* in the soil. A great number of experiments should be made for the purpose of testing the relative merits of deep and shallow planting.

Planting machines have been recently invented for putting in this grain, which greatly diminish the labor, while they perform the operation more perfectly. A light horse, or mule, and boy can furrow and drop the seed, cover and roll, from eight to twelve acres per day; and with entire uniformity as to distance, depth of covering, and quantity of seed in each hill.

Cultivation.—The culture of the growing corn plants varies also according to the soil and the season, as well as the attentive skill and implements used by the grower. Some use nothing but the *hoe*, especially in small patches, and hoe

* Essay of J. M. WOLFINGER, of Pennsylvania, in U. S. Agricultural Report for 1860.

it from two to four times, as weeds or drought require. Others use nothing but the *plow*, and plow the ground around their corn plants from two to five times, and do it crosswise, or both ways, if the crop admits of it, as it should. Others, again, use nothing but the *cultivator*, and cultivate it from two to five times, and also both ways. Some, after plowing or cultivating the crop, use the hoe in dressing it up nicely.

The method in the line of true economy, is to stir the soil with the plow, and cultivator, or horse hoe, so thoroughly and so frequently, that the hand hoe will not be required. There is believed to be a difference in expense of two hundred per cent. in favor of machine culture. Never heap up the soil around the plants, except in very heavy or very wet soils. Flat culture is the true practice. Stir the ground often in dry weather; it is almost as serviceable as irrigation. Never stir it when it is wet. The first stirring of the soil after the corn is fairly above ground, should be deep, and every additional stirring shallower and shallower, as the plants increase in size and extend their roots. Don't interfere with the roots, but keep the earth mellow about them, and weeds from drawing their nourishment.

Some farmers plant pumpkins, or field-squashes in every third, fourth, or fifth row of corn, and as far apart in the row. This vegetable feeds on elements somewhat different from those required by corn, so that the corn is not supposed to be injured by it, but rather benefited in dry seasons.

Manure for Corn.—We have treated this matter indirectly under the topic "Manures," but will here revert to it briefly. In the West, farmers generally regard their lands strong enough without artificial fertilization; but they will soon see the necessity of imitating their brethren of the East. The best way, perhaps, of manuring corn ground is to cover it with a good coating of barn-yard manure, and plow it down, and top-dress it with another coat of a different kind, and harrow it well before planting. It is a rapid feeder and grower, and strong manuring and thorough tillage are indispensable to an extra yield of superior corn. Manuring *in the hill*, either when the grain is planted or when the blade is a few inches high, takes less manure and does nearly, if not quite, as well for the crop as a broadcast, top-dressing manure scattered all over the ground. Experience has shown that a small quantity of manure put into each hill with the seed is of great benefit, as it makes the corn germinate and grow

up rapidly and strong, and get an early start; and after it is about a foot high it will, if planted on a grass clover lea, push its stalks ahead with great vigor, if the weeds and grass are kept down.

The following substances are generally used as top-dressings and hill manuring for corn crops, to wit:*

1. *Stable and Barn-yard Dung.*—Stable and barn-yard manure, applied at the rate of a whole or half shovelful to each hill of corn.

2. *Hog Dung.*—The same quantity of pure or unmixed hog dung, applied in the same manner. Hog dung is one of the very best manures for corn. Cornfields hogged down, or allowed when ripe, to be overrun with hogs, that eat the corn or nubbins, not only fatten the hogs, but are rendered rich for a wheat crop. This is a common practice among the farmers of our Western States, but it is a slovenly and wasteful way of manuring land.

3. *Lime.*—Finely air-slaked lime, sown broadcast over the ground before the corn is planted, at the rate of from twenty to one hundred bushels per acre.

4. *Gypsum.*—Ground gypsum, or plaster, strewn broadcast, at the rate of from a half to two bushels to the acre, or a spoonful or small handful of plaster applied to each hill of corn as soon as the plants appear above ground. The mere stirring of the soil alone renders the ground porous or sponge-like; but plastering is a powerful auxiliary in securing the necessary degree of moisture, because it attracts moisture from the atmosphere and imparts it to the soil. Plaster will sometimes nearly double the product of corn on sandy lands, gravelly knolls, and slaty hillsides, but seems to do but little good to corn-growing on clay or heavy and hard soils.

5. *Salt.*—Salt sown broadcast, at the rate of from one and a half to four or five bushels to the acre, and harrowed in before the corn is planted.

6. *Wood Ashes.*—Wood ashes applied to sandy soils are a valuable manure, and on some soils leached ashes are as good as unleached. Land too poor to grow eight bushels of corn per acre has been made to produce forty-five bushels per acre by the use of wood ashes alone, for they stimulate its growth like plaster. Wood ashes, however, are more valuable on a sandy soil than any other, as they enable the sand to retain its moisture—a matter of great importance—hence such ashes as are used to very

* Essay of J. M. WOLFINGER.

great advantage on the sandy lands of Long Island, near the city of New York, and also in the State of New Jersey.

7. *Stone Coal Ashes*.—Stone coal ashes possess the same general nature that wood ashes do, though in an inferior degree, and hence are a good manure for corn crops.

8. *Bone Dust*.—Bone dust should be well mixed with fine earth, and sown broadcast and harrowed in at the rate of from ten to twenty bushels to the acre, before the corn is planted.

9. *Guano*.—Guano mixed with from three to five times its own weight or bulk of fine earth and sown broadcast, at the rate of from two hundred to four hundred pounds of guano per acre, and well plowed or harrowed into the soil before the corn is planted, or put into the hills with the seed-corn, at the rate of from two to three table-spoonfuls of this guano and earth mixture to each hill of corn. The pure guano alone might prove too hot for the corn-seed, and so should be used very cautiously.

10. *Cotton Seed*.—Cotton seed sown broadcast, at the rate of from fifty to one hundred bushels per acre, before the corn is planted, or put into the hills with the seed-corn, at the rate of a handful to each hill of corn. But the cotton seed must be well rotted or decomposed, or it will overheat and greatly injure, if not destroy the seed-corn.

11. *Compost Manure*.—Compost manures, composed of fine, rich earth, and wood ashes, stone coal ashes, lime, plaster, salt, human excrement, hen, and dove dung, and the like, must be well intermixed and sown broadcast, or applied at the rate of a small handful of the compost to each hill of corn. Wood ashes and plaster, in equal parts, well mixed, and applied at the rate of from two to six bushels to the acre, broadcast, or a gill or small handful of the mixture put into the ground with the seed-corn, or to each hill of corn after the plants are up, is a valuable manure; also, wood ashes, plaster, and lime, mixed in equal parts, and sprinkled over the corn hills as soon as the plants are above the ground. Some prefer a mixture consisting of three parts of unleached ashes, two parts of slaked lime, and one part of the ground plaster well mixed, and applied at the rate of a large handful of the mixture to each hill of corn. Wood ashes, plaster, lime, and salt, mixed together in equal parts, and put under the seed-corn at the time of planting, at the rate of a handful of the mixture to each hill, will kill or drive away the cut and grub worm, attract carbonic acid gas from the air, retain

moisture, and stimulate and nourish the corn plants, and increase the yield one-third. When wood ashes alone are used, it is customary to apply a small handful of it, either leached or unleached, to each hill of corn; and that would, perhaps, be the proper quantity of plaster, or of lime, when they are used alone, while the one-half of that quantity of salt would be sufficient. Some soils will require a good deal more of these, as well as of all the other manures above mentioned, and hence it is impossible to lay down any fixed rules upon the subject. Every corn planter must determine the proper qualities of each for himself, as he best can from his own experience and that of his neighbors.

12. *Red Clover and Grasses*.—The cheapest, most easily attainable, and best of all manures for a corn crop, is a dense mass of red clover, either in its green or in its ripened and dried state, plowed down to the depth of three or four inches only, just deep enough to prevent wastage, and yet near enough to the surface of the ground to be acted on by the sun's heat and the air, and also in its decay to afford certain, active, and constant nourishment to the young and expanding roots of the corn growing over it remains. Corn and wheat grown over clover leys, are very generally freer from disease and insects, and better in yield and quality, than crops grown on or with animal manures.

The New York Agricultural Society offered a prize to test the value of various manures as applied to corn. The prize was taken by Jos. HARRIS, editor of the *Genesee Farmer*. The soil on which the experiments were made, is a light sandy loam. It has been under cultivation for upward of twenty years, and, so far as could be ascertained, had never been manured. It had been somewhat impoverished by the growth of cereal crops, and it was thought that for this reason, and on account of its light texture and active character, which would cause the manures to act immediately, it was well adapted to the purpose of showing the effect of different manurial substances on the corn crop. The land was a clover sod, two years old, pastured the previous Summer. It was plowed early in the Spring, and harrowed till in excellent condition. The corn was planted May 23, in hills three and one-half feet apart each way. Each experiment was made on the one-tenth of an acre, and consisted of four rows, with one row between each plot, without any manure. The manures were applied in the hill immediately before the seed was planted. With the

superphosphate of lime, and with plaster (gypsum, or *sulphate of lime*), the seed was placed directly on the top of the manure. The ashes were dropped in a hill and covered with soil, upon which the seed was planted, that it should not come in contact with the ashes. Guano and sulphate of ammonia were treated in the same way. On the plots where ashes and guano, or ashes and sulphate of ammonia were both used, the ashes were first put in the hill and covered with soil, and the guano or sulphate of ammonia placed above, and also covered with soil, before the seed was planted. The ashes and superphosphate of lime were treated in the same

way. It is well known that unleached ashes, mixed either with guano, sulphate of ammonia, or superphosphate of lime, mutually decompose each other, setting free the ammonia of the guano and sulphate of ammonia, and converting the soluble phosphate of the superphosphate of lime into the insoluble form in which it existed before treatment with sulphuric acid. All the plots were planted on the same day, and the manures weighed and applied under Mr. HARRIS'S immediate supervision. Everything was done that seemed necessary to secure accuracy. The following table gives the result of the six experiments:

Number of the plots.....	DESCRIPTIONS OF MANURE AND QUANTITIES APPLIED PER ACRE.	Bushels of ears of soft corn per acre.....	Bushels of ears of soft corn per acre.....	Total number of bushels of ears of corn per acre.....	Increase per acre of ears of soft corn.....	Increase per acre of ears of soft corn.....	Increase per acre of ears of soft corn.....	Total increase per acre of ears of soft corn.....
1	No. manure.....	60	7	67				
2	100 pounds plaster, gypsum, or sulphate of lime.....	70	8	78	10	1	11	
3	400 pounds unleached wood ashes and 100 pounds of plaster (mixed).....	64	10	74	8	3	11	
4	150 pounds sulphate of ammonia.....	90	15	105	30	8	38	
5	300 pounds superphosphate of lime.....	70	8	78	10	1	11	
6	150 pounds sulphate of ammonia and 500 pounds superphosphate of lime (mixed).....	85	5	90	25			23
7	400 pounds unleached wood ashes (uncertain).....	60	12	72		5		5
8	150 pounds sulphate of ammonia and 400 pounds unleached wood ashes (sown separately).....	87	10	97	27	3	30	
9	300 pounds superphosphate of lime, 150 pounds sulphate of ammonia, and 100 pounds unleached wood ashes.....	100	8	108	40	1		41
10	400 pounds unleached wood ashes.....	60	8	68		1		1
11	100 pounds plaster, 400 pounds unleached wood ashes, 200 pounds superphosphate of lime, and 200 pounds Peruvian guano.....	95	10	105	35	3	38	
12	75 pounds sulphate of ammonia.....	78	10	88	18	3	21	
13	200 pounds Peruvian guano.....	88	13	101	28	6	34	
14	400 pounds unleached wood ashes, 100 pounds plaster, and 500 pounds Peruvian guano.....	111	14	125	51	7	58	

Harvesting.—There are five methods, each of which is considerably in vogue, for harvesting corn: 1. The corn is cut at the surface of the ground when the grain has become glazed or hard upon the outside, put immediately into stooks, and, when sufficiently dried, the corn and stalks are separated, and both secured. 2. The tops are taken off when the corn has become glazed, and the grain permitted to remain till October or November upon the butts. 3. Both corn and stalks are left standing till the grain has fully ripened, and the later become dry, when both are secured. 4. The corn is husked on the stalk and removed, while the entire stalk is left to be plowed under on the field. 5. Neither corn nor stalk is saved, but cattle are turned in for an hour in the morning and another at night, to harvest as they require.

This last mode is confined to the large stock farms of the West, but even the apparent necessity, which the immense crops impose, does

not settle the question of economy in its favor. The fourth mode is slovenly, but some large farmers can not avail themselves of a better way. The second mode is much practiced, but careful experiments show that it is injurious to the proper ripening of the grain, and yields less corn, though fresher fodder.

The first plan is generally deemed the best. It not only saves more of the succulent stalks for fodder, but both science and experiment teach that the maturing ear gathers something like one-fifth of its sustenance from the stalk after cutting up by the roots. Science instructs us that the nourishing sap, springing upward from the earth, passes through the stem and into the leaf where it is modified by an element which it drinks from the air, and is fitted to serve as the proper food of the grain. But this digestive process goes on *above* the ear, and, if the stalk be removed, the seed loses the nourishment by which it might become perfect.

This theory of ripening has been abundantly

tested and verified by many farmers in many States. Judge BUEL, about the 5th of September, selected four rows, in different parts of his corn-field, and topped every other hill in each row. He gives the result, as follows:

To recapitulate, row No. 2, on which the experiment was commenced, taken by itself, is as follows, viz.:

46 hills, on which the stalks had <i>not</i> been cut, gave 42 lbs. 8 oz. dry shelled corn, equal to, per acre.....	40 bush. 8 lbs.
46 hills, from which the stalks <i>had</i> been cut, gave 33 lbs. 7 oz. dry shelled corn, equal to, per acre.....	47 " 18 "
Loss by cutting the stalks, per acre.....	12 " 46 "

The four rows, taken together, stand as follows:

No. 1 and 4, on which no stalks were cut, gave an average of, per acre.....	40 bush. 8 lbs.
No. 2 and 3, from which half the stalks were cut, gave an average of, per acre.....	54 " 23½ "
Loss by cutting one half the stalks, per acre.....	5 " 38½ "

On cutting all the stalks, would make a loss equal to, per acre.....	11 " 21 "
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Any farmer who doubts that this would be the average result of a similar experiment, had better try it for himself.

The stalks, blades, and tops of corn, if well secured, are an excellent fodder for neat cattle. If cut, or cut and steamed, so that they can be readily masticated, they are superior to hay. Besides, their fertilizing properties as a manure are greatly augmented by being fed out in the cattle-yard and imbibing the urine and liquids which always there abound, and which are lost to the farm, in ordinary yards, without an abundance of dry litter to take them up.

There is another argument, by no means despicable, which commends plan No. 1—it gives an opportunity for a continuation and revival of the memorial corn-husking frolics in shadowy farms on moonlight Autumn nights, when lanterns swing from beam and ladder to illuminate the assembled neighborhood; when song and friendly jest go round, and when "red ears" are followed by red cheeks, and apples and pumpkin pies and cider diminish as the golden pyramid increases. Americans have fewer holidays and festive gatherings than any other people; there is too little fun and music in our grim struggle of money-getting; let us welcome any pretext for tempering our sober days with innocent relaxation.

Large Crops of Corn.—There is a tradition that somebody, sometime, somewhere, raised two hundred and forty bushels of corn to the acre—but we are not acquainted with that successful man. It seems to be duly certified,

however, that Dr. J. W. PARKER, of Columbia, S. C., raised two hundred bushels and twelve quarts of shelled corn on an acre, in 1857. He soaked the seed for twelve hours in a strong solution of niter, and planted in drills, ten inches in the row. The ground was then rolled and left perfectly level. The field had been twice plowed and twice manured with compost manure, besides an application of three cart-loads of air-slacked lime and two sacks of salt to the acre, and guano and plaster in the furrows. It was also irrigated. It would have been very ungrateful soil, if it had produced less than two hundred bushels to the acre! A hundred and fifty bushels to the acre is occasionally raised, and with good culture a hundred may be often reached. Every field in America ought to average eighty bushels—the actual average was only twenty-eight bushels in 1867. It is produced cheaper per bushel, and more bushels per acre now than at any former period in our history, by those farmers who keep pace with the increase of agricultural knowledge in the United States.

Corn-Cribs.—Every corn-crib should have a water-shedding of some sort; it is a useless and foolish waste to leave any grain exposed. Even if corn is at a low price it makes a material difference whether it sells for No. 1, or No. 2 and rejected. The cribs should not be more than three or four feet wide at bottom and six at top, elevated from the ground, and open all round to a free circulation of air. This will be more definitely treated elsewhere.

Measuring in Bulk.—A correspondent of the *Prairie Farmer* gives a rule for ascertaining the number of bushels of shelled corn in a crib of ears, by multiplying the cubic feet in the pile by .45 (forty-five hundredths). "Example: In a crib or bin of corn in the ear, measuring ten feet in length, eight feet high, and seven feet wide, there will be two hundred and fifty-two bushels of shelled corn. Thus— $10 \times 8 \times 7 \times .45 = 252$. This rule agrees with weighing corn—seventy pounds to the bushel in the ear. But the rule applies only to localities where three heap half-bushels of ears make a bushel of shelled corn." Corn shrinks in weight and bulk, between harvest and the succeeding Spring, ten to twenty per cent., shelled corn less than that on the cob.

Crows.—Tarring and otherwise coating the seed has already been referred to. (Gas tar can not safely be substituted.) Encircling the field with twine, tied high on poles, is thought to make crows shy of entering the charmed pre-

cinets, but it is not by any means infallible. Some are shrewd enough to detect the harmless character of the trap. Many farmers find more certain relief in hanging one or more dead crows where the carcasses can be inspected by reconnoitering brethren. Others tie young crows on twine stretched across the field; their obvious calamity causes the parental birds to keep at a distance. The old-fashioned way of



frightening crows and blackbirds was the erection of effigies, known as scare-crows, of which the accompanying engraving is a fair reminder. Don't kill birds of any sort, except for game. They are the farmers best

friends in the long run, for the destruction of pestilent vermin is their chief life-work, while a bite at corn-fields and cherry-trees is only to procure, occasionally, a more plentiful lunch. A happy illustration of the folly of slaying the birds is given by LONGFELLOW in his "Birds of Killingworth."

Cotton.—A soft downy substance, resembling fine wool, growing in the capsules or pods of the *Gossypium*, or cotton-plant. This plant is indigenous to the tropical belt all around the earth, but it grows best in rich alluvial bottom lands, or in fine moist sandy loams, containing at least eighty per cent. of sand.

History—HERODOTUS wrote, four hundred years before CHRIST: "There is a plant in India which produces wool, finer and better than that of sheep, and the natives make their clothes of it." The cloth of his time was called "fleeces from trees." ALEXANDER soon brought it into Persia, Arabia, and Egypt. In the first century, A. D., the cloth was embellished in a rude fashion, with a fantastic print of flowers. COLUMBUS found cotton in Hayti, and CORTEZ found cotton cloth of fine and firm texture in use by the Aztecs. The Indians of the United States seem to have known nothing of its value. It was introduced into Georgia from Barbadoes, about the middle of the seventeenth century, but it was not much grown for a hundred years.

As early as 1400, the manufacture of cotton into cloth found its way into Europe, but it struggled with persecution for two hundred years before it reached France and England. The first was woven with wool on a hand-loom,

slowly and tediously. In 1730, MR. WYATT first spun yarn cotton by machinery. In 1741, raw cotton imports into England amounted to 1,900,000 pounds. In 1742, at Birmingham, England, the first cotton spinning-mill was built; its motive power was mules or horses. In 1760, \$1,000,000 was the entire value of manufactured cotton goods in England. In 1761, ARKWRIGHT (afterward knighted) obtained the first patent for his spinning-frame. In 1767, the spinning-jenny was invented by JAMES HARGRAVE, which spun eight threads instead of one. Raw cotton imports were about 3,000,000 pounds.

In 1785, Rev. Mr. CARTWRIGHT invented the power-loom. The same year, WATT's steam engines were first introduced as the motive power in driving machinery in cotton manufactories. The following year, chlorine was first used for bleaching. In 1789, short staple cotton began to be cultivated in the South, and Sea-Island cotton was first introduced into England. In 1790, at Pawtucket, Rhode Island, Mr. SLATER erected a cotton-mill—the first in America. In 1792, ELI WHITNEY, of New Haven, Connecticut, then residing in Georgia, invented his first cotton-gin. Before that time, the seed was separated from the ball chiefly by hand—a very expensive process. By WHITNEY's gin, fifty pounds of cotton could be cleaned in a day, which was fifty times as much as could be done by hand. With the best improved gins now in use, one thousand five hundred pounds can be cleaned in a day, equivalent to the labor of a regiment of men! It was this machine that gave the great stimulus to cotton culture in America.

In 1805, the first power-loom was introduced into the United States, at Waltham, Massachusetts, and twenty years later the first cotton factory was erected at Lowell.

The recent increase in the cotton product of the world has been astonishing. Little was exported or produced in the United States prior to 1795. It is said that in 1784, an American vessel having seventy-one bags of cotton on board, was seized at Liverpool, on the plea that so large an amount of cotton could not have been produced in the United States. And when an old planter obtained fifteen small bales from five acres, it was not thought strange that he exclaimed, "Well, well, I have done with cotton; here is enough to make stockings for all the people of America." In 1791, the export was the meager item of 189,316 pounds, or less than 5,000 bales; in 1800 it had reached 17,789,803 pounds;

in 1860, 1,767,086,338 pounds, or 3,812,345 bales, and this was scarcely more than half of the entire product. The crop of the United States has been equivalent to seven-eighths of the production of the world; and the manufactories of the United States have attained a consumption of nearly one-fifth, or twenty per cent. of this crop.

Climate.—The cotton plant is a child of the sun, flourishing under ardent skies, growing with superior luxuriance in dry seasons, and withering under the influence of a soaking sub-soil and long-continued storms. In latitude thirty to thirty-two degrees in this country, upon the proper soils, it luxuriates in its greatest vigor. It delights not in an arid, brazen sky, but in an unobscured sun by day and copious dews at night—abundant moisture with continuous sunlight in its season. It may now be considered a settled question, that cotton must command very high prices to average a paying crop north of the thirty-sixth parallel.

In other words, the line drawn through Nashville, Tennessee, and Raleigh, North Carolina, divides the country into two sections. In the northern portion cotton is profitable only when it commands war prices, and south of this line its growth will be lucrative until it falls below ten cents a pound; but this line is not the northern limit of the cotton belt proper. In the Valley of the Mississippi one must go below Memphis to find an entirely suitable climate, and on the Atlantic sea-board he must go south of Cape Hatteras. The western limit of the cotton-fields of the United States is a line passing north and south through San Antonio, in Texas.

When the fiber sells at forty cents to one dollar per pound, there is an inducement to encounter greater climatic risks, and accept smaller and more uncertain returns. It is, therefore, planted at the present time, or was recently, to a considerable extent in more northern latitudes, in soils deemed most suitable—in Kentucky, in Missouri, somewhat largely in Kansas, in southern Illinois and Indiana, on the eastern shore of Maryland, and in southern Delaware. There is a possibility of ripening, under favorable circumstances, up to forty degrees north latitude, with success sufficient to tempt experiment when the fiber approaches its highest commercial figure. Georgia, Alabama, and Louisiana raises more than 500 pounds of unginued cotton to the acre; Mississippi, 650; Arkansas, 700,

and Texas 750. The unginued cotton weighs four times as much as the clean staple.

Cultivation of Sea-Island Cotton.—The following is from the *American Agriculturist*:

"Preparing the Land for the Crop.—Early in February, any hands not engaged in preparing the previous crop for market are employed in cleaning up the rested fields, and either in burning off the fennel weeds and grass of the previous year, or in listing them in at five feet apart, to serve as the base of the future ridges or bed. There is much difference of opinion upon the subject of burning or listing in; for myself, I am inclined to take the first opinion, believing that the light dressing of ashes the field receives from burning off is more beneficial to the soil than the decay of the vegetable matter, and renders it less liable to produce what is a growing evil, the rust, a species of blight much resembling the rust or blight upon wheat, and which takes place about the same period, just as the plant is putting out and preparing to ripen its fruit.

"Ridging.—The land being listed in short lines across the entire field, at five feet apart, the operation of ridging is commenced about the first of March. The ridges occupy the entire surface; that is, the foot of one ridge commencing where the other ridge ends, and rising about eight inches above the natural level of the land, thus presenting a surface almost as smooth, and almost as deeply worked as a garden-bed. This ridging is carried on but a few days ahead of the planting. The ridge, if the operation has been carefully done, is from two to two and a half feet broad at the top; it is then trenched on the upper surface with the hoe, six inches wide, and from three to six inches deep, depending upon the period of planting.

"Planting.—In the beginning, if the seed is covered more than two inches, the soil will not feel the influence of the sun, and the seed will not vegetate later; that is, in April, up to the first of May, you must give from three to four inches of covering to preserve the moisture, or there, too, you fail from an opposite cause, the wind and burning influence of the sun drying the soil too much for vegetation. In most countries, after sowing the seed the roller is applied; but in cotton planting, in our ridge husbandry, the foot, in covering the seed and pressing down the earth, well supplies its place.

"Quantity of Seed per Acre.—A bushel of seed is generally sown to the acre; I believe half a bushel is better, for where the evil comes,

whether the worm, or wind, or drought, or wet, there is no security in the many; but, on the contrary, where they come up thin, they soon grow out of the way of injury from any enemy.

"After Culture.—The cultivation of Sea-Island cotton is carried on by the hand hoe, and the quantity always limited to four acres to the laborer. The operation of weeding commences as soon as we finish planting, because, in our flat and sandy soils, the grass-seed springs with the first growth of the cotton, and by the time we finish planting, say the first of May, what we planted in March requires the hoe. The land is kept in the operation of hoeing and weeding, as far as may be, at its original level, the beds neither increased nor diminished, that rains, which generally fall with beating power, and in redundant quantity in the month of August, may as little as possible injure the growing plants, which are then in full bearing. The young cotton is thinned out slowly at from six to twelve inches apart on the ridge by the 10th of June. As soon as the rains commence, which is about the last of July, it is wise to leave nature to herself, and no longer disturb the soil; four hoeings, if well done, and the grass well picked at each hoeing, is enough, nor does any after growth of grass do injury."

Hon. JOSEPH B. LYMAN, of Louisiana, gives in the United States Agricultural Report for 1866, the result of his experience in cotton culture (up-land) as follows: . "Cotton differs from almost every other plant cultivated in this country in the length of the season required for reaping the full profits that may be derived from it. This results from the fact that cotton is, in its nature, a perennial, and consequently displays no alacrity in maturing its fruit before frost, hence the necessity, on the part of the farmer, of pressing the advancement of the plant as rapidly as possible during the Summer months. The great desideratum with the cotton planter is to obtain the longest possible period for his harvest season; consequently, during the early part of the Summer, his policy should be to press the crop and obtain open bolls early in August, so that the pickers may start in with their bags and baskets by the fifteenth or twentieth of that month. The first cultivation the crop receives should commence about fifteen days after the planting. A light plow should be run close to the line of plants, cutting away the weeds and grass and stirring the earth to a moderate depth. The hoes follow, smoothing the inequalities produced by

the plow, and clearing the intervals between the clumps of young plants. In the ordinary mode of planting, when the seed is scattered thickly through the drills, this first cultivation is called 'chopping out.' Two weeks after, the hands should go over the crop again, thinning out the young plants to a stand. This is sometimes done at the first cultivation, especially in strong soil. This second cultivation should be the most thorough of any, thickest plants only being spared, and the rest being pulled up with care so as not to displace the roots of those allowed to remain. A little fresh earth is thrown around the roots of the young plants, and the entire ridge, as well as the intervals between, should be made perfectly clean.

"On a good soil, with favorable seasons, the growth will now be rapid, and the subsequent cultivation can be effected mainly with the plow. Here it should be remarked that deep plowing, except when the land is bedded up for a crop in spring, is never beneficial. It breaks the lateral roots of the plants, and this retards the development of the pod and curtails the picking season, hence, the best plow for cultivating cotton is one which, instead of turning the soil, scrapes the surface of the earth. The implement in common use is very well adapted to this purpose, and consists of a common scooter plow, with wings attached three or four inches above the tip, and set in such a way as to pass just beneath the surface, and throw a little ridge of fresh earth close to the stems of the plants. They often, when skillfully used, clean the surface so thoroughly that the hoes can pass over the crop very rapidly. Sometimes early in the month of July, on a good soil, the plants will be so far advanced that the boughs will touch and perhaps lock across the middles. Many planters think that little is gained by running the plow after the crop attains this growth, but the more the ground is stirred, the more readily will the heat of the sun penetrate the soil and fall upon the roots of the young plants, and this is what is required to hasten their development. No rule can be laid down as to the number of times the farmer should go over his crop, as the cultivation must vary with the season and the condition of the soil. All the movements in the cotton field should be brisk, so that the force may pass along over the crop rapidly. Cotton is a very jealous plant and will not struggle with weeds or grass for a division of the fertilizing properties of the soil. It will not grow unless

kept very clean and the full energy of the soil is kept concentrated upon it alone."

Picking.—In the most advanced fields on the southern margin of the cotton zone, picking may commence early in August. In Tennessee and the northern part of Alabama and Mississippi the month of September may be somewhat advanced before many open bolls are to be seen. From this time on, for three or four months, cotton picking may be said to be the sole occupation of every industrious person on the place. The foreman or proprietor should see that every hand is supplied with the necessary facilities for pushing his labor to the very best advantage. The baskets into which the bags are emptied should be so placed that the picker should start from them, go out on one row and return on the next, the rows being short where the cotton is thick and well open, so that he will not have any unnecessary weight to carry on the last half of his bout. To secure these advantages it is recommended to select roads at proper intervals, unless the field itself is long and narrow.

It is worth while also for the planter to devise improvements in the bag which is to be carried for four months by the cotton picker. The form which has been almost universal throughout the South is simply a yard of coarse muslin closed at one end, with a strap of the same material fastened to the sides, to be passed over the shoulder. This arrangement is quite too rude and awkward. A much better receptacle for the cotton as it is picked would be a shallow reticule, made of stiff canvas or of leather, belted around the waist and held up by straps crossing over the shoulder. Let it be made in such a way that the top will constantly stand open and extend all around the front of the body. By making it long it need not be so deep as to interfere with the movement of the legs. Formed thus, it would leave all the limbs free in their motions, and the distance that has to be passed in carrying a handful of cotton from the pod to its receptacle would be very much abridged.

It is necessary to dry all cotton that has been picked after a rain, or when heavy dew is on the field. This should be done on a scaffold erected for the purpose near the gin-house or cotton-sheds. It is not best, however, to sun cotton too long, as the essential oil which is drawn into the fiber from the seed, giving it greater weight and imparting to it a fine, pale straw color, is thus evaporated; nor is it ad-

visable, on that account, to gin cotton as soon as it is picked. It is better for it to stand a number of weeks in the seeds in the cotton-sheds, allowing time for the oil to infuse itself through the fiber. Success in harvesting a cotton crop depends very much on the alacrity of the force employed in the field. Hands thus engaged should be fed well and frequently. If they are laboring on a miasmatic soil it is policy to give them a cup of coffee the first thing in the morning. The coffee should be boiled twenty minutes or half an hour, to extract all its anti-miasmatic properties, or those in which it resembles quinine. Besides the cup of hot coffee, the hands should have a piece of bread or a sandwich if they labor one or more hours before breakfast, as is the custom. By cheerfulness, a full diet, and avoiding extremes of the daily temperature, it is not difficult for laborers of whatever race to preserve very good health in the cotton field.

As the season advances the days are shorter, and rains are somewhat more frequent and much more injurious to the staple; hence, the planter should feel the importance of being as active as possible in the early days of the season. By the twentieth of September, he will know, almost to a certainty, the amount of the crop he is to gather. He is then beyond the reach of almost any agency that can materially lessen the number of bales. Hence, if his pickers are not equal to the work in hand, active measures should be taken to reinforce them. A good hand can cultivate fifteen acres in cotton more easily than he can harvest the crop of ten acres.

Ginning, Baling, and Marketing.—The cotton-gin now in use, of which WHITNEY'S was the model, consists of a series of fine-tooth circular saws, fastened upon a wooden cylinder about three-quarters of an inch apart, and revolving in slits cut in a steel plate, less than a quarter of an inch wide. A mass of cotton in the seed is laid upon this plate. As the saws revolve, the teeth, passing down between the openings, pull off the lint from the seed, and carry it through with them, the slits being too narrow to allow the seeds to follow. On the lower side of the cylinder, is a revolving brush which takes off the lint as it comes through on the saw teeth, and a blast from a revolving fan carries it back through a flue to the lint-room.

This is the famous machine which revolutionized the agriculture of the South seventy years ago. Without this invention, cotton

would not now amount to any more than bees-wax as an article of American export. Every planter should be mechanic enough to regulate the number, pitch, and shape of the teeth of the saw-gin, because the efficiency of the machine and the quality of the cotton depends much on these items, as a little experience will demonstrate.

Mr. PRATT, of Alabama, who has had thirty years' experience in the manufacture and use of gins, says that a machine that cleans but one or two bales in a day, is decidedly better than one which gins seven or eight bales a day, and that rapid ginning has been an almost universal fault among cotton growers hitherto. The annual amount that can be ginned by a machine varies also according to the number of saws it carries. Few, if any, are made with more than eighty saws.

The gin may be set upon the ground and driven by horse-power, after the manner of a threshing machine, or a number of gins may be placed side by side, and all of them driven by a steam engine. Between the rudest and most temporary arrangement, by which a crop is ginned in a large walled tent, and a thoroughly built steam gin-house, with every appliance for doing the work in the best manner, there is every grade of convenience in the size, arrangement, and value of Southern gin-houses. By far the greater portion of the cotton crop of the United States is ginned by horse-power. The gin, or gin-stand, as it is usually called, costs from one hundred and twenty-five to two hundred and fifty dollars, according to size, number of saws, fineness of teeth, and care in the construction of its parts. The necessary machinery for driving it can be made by a wheelwright for about five hundred dollars. A very frequent size for the gin-house, exclusive of the cotton-sheds, is thirty by sixty feet, but the cost of putting up such a building varies so greatly, according to the cost of lumber and the skill of the farmer, that no estimate can be given. It may be said in general, however, that when a farmer commences the cultivation of cotton upon a place where there is no gin, by employing two or three of the laborers to assist a carpenter during the months of July and August, and by the expenditure of about a thousand dollars, he may push his gin-house to a sufficient degree of advancement to enable him to gin out his first crop during the Fall and Winter.

It is earnestly recommended that improvements be made in the mode of pressing and

preparing for market. The present methods are utterly extravagant. Half of the crop of 1860 was pressed by wooden screws working in a huge, clumsy, unsheltered wooden framework, and the other half was baled by an iron screw propelled by a mule. Neither of these reduces the bale to anything like the proper dimensions for exporting.

So the bales are sent to the export cities, where they go through *another* process of compression, if intended for a European market. The plantation bale of sixty to eighty cubic feet is diminished in bulk till it measures only thirty-two cubic feet, then it is deemed fit to ship to foreign ports. This slovenly habit of sending cotton from the plantation half pressed is doubly expensive: 1st, it compels a sale at a reduced price; 2d, it almost doubles the cost of transportation. The East India cotton bale, weighing four hundred pounds, is reduced to a cube of two and a half feet—half the size of the New Orleans bale. Every large planter should send his bale from his hands straight to the door of the factory without breaking bulk. The pressing should be done by steam, and the boxes should be of the uniform size of a cube of three feet each—twenty-seven feet, weighing four hundred pounds.

Chicory.—We place chicory among field-crops, not so much because it is raised in the field by the farmers of America, as because it might be, and ought to be. It is an indigenous perennial. For some years it has been extensively grown in England, and both in that country and in this, the root, roasted and ground, has become an important article of commerce, being used as a substitute or an adulterant for coffee. Almost all ground coffee is largely modified by burnt chicory, and the dishonest grocer sells the compound at three or four times its cost. But the resultant beverage is at least harmless.

The Magdeburg, large-rooted, is the variety most used for coffee. It is sown and cultivated like carrots or parsnips, and the roots will go twelve to twenty inches deep if the ground is fertile and mellow. The plants should not be nearer than from five to six inches in the row, and the rows should be fifteen inches apart. It is well to sow the seed thicker than this in the row, and then, if the plants are too thick, thin them out when they are large enough to require it.

When the roots have attained the size of a man's finger they may be pulled for use. It is

prepared in the following way: Cut the tops off close to the root, wash the root clean, split it lengthwise into strips, say one-third of an inch thick; cut these strips up three-fourths of an inch long, and put two quarts of these into a common-sized tin pan, and set it facing the sun, and they will soon be dry enough to bag up and put away. As you want to use it put as much on a tin plate as you can conveniently brown at once, set it in your stove oven, and see to it that you do not burn it, for, being of a spongy nature, it burns very easily. As to the quantity necessary for a family at one meal, no directions can be given. It is better the second time it is steeped than the first. Add sugar and cream as with other coffee. An ounce of seed is sufficient for two ordinary families for a year.

The large succulent leaves are frequently used as a salad, and for this purpose, are blanched. A delightful Winter salad can be obtained by cutting off the old leaves within half an inch of the crown and setting the roots in moist sand or light mold in the cellar. Fresh, slender leaves soon grow out of this root, and, being deprived of light, they are much more delicate and tender than those which grow in the open ground. The plant is very hardy, of easy culture, and is probably adapted to every section of this country.

Flax.—The use of flax for textile purposes (linen cloth), is almost as old as human history, and the plant has a very wide range of temperature, reaching from Egypt to the polar circle. The following directions for its culture embody the practical experience of many flax-growers:

Soil.—Flax desires a rich, friable, and clean upland soil, but will do well on any ground that is suitable for wheat or corn.

Preparation of Soil.—All flax-growers unite in stating one thing as essential to success in growing flax—thorough preparation of the ground by plowing and harrowing. Most farmers agree in saying that it should follow corn, with deep Fall plowing, and then harrowing before sowing, until the surface is fully pulverized, and made as smooth as possible.

Sowing.—The seeding should be done as early in the Spring as the weather and state of the ground will admit of fine tillage—sometimes, in a moderate latitude, in March, but generally the sowing time ranges from the 10th of April to the 10th of May, according as the season is early or late—early seeding ordinarily

producing much the best crops of lint and seed. The seed should be bright, plump, and sown very evenly, at the rate of one bushel and a half to two bushels to an acre, where the fiber or straw is the main object, and one bushel to the acre where the seed is the principal object. Heavy seeding will produce as much seed as light seeding, and it is absolutely necessary to seed heavy to raise a crop of flax, producing good marketable lint. After sowing, bush in the seed lightly, so that it will only be covered sufficiently to germinate, and roll the ground, to compact the earth around the seed to aid its germination, and to form an even surface, so as to enable the reaper to cut the flax as close to the roots of the stalks as possible. "Flax grows on an average more in the night than in the day, and more in troubled weather than in sunshine—a proof that it requires for its success, a moist atmosphere."

The Seed.—Too much pains can not be given to get that seed which is fully matured and perfectly clean—free from all foul seeds—both to secure a good merchantable crop, and to preserve the land upon which it is sown from troublesome weeds. It was this fact, more than any other, that led to the system of "loaning seed and contracting for the crop," which has been practiced to a large extent in Ohio, Indiana, and elsewhere.

Time and Mode of Cutting.—Cut the flax when the seed bolls begin to turn brown, in order to prevent the loss of seed in harvesting, and also to make a good lint. If the flax is left standing after the seed bolls are ripened and have turned brown, the seed will waste badly in handling, and, what is worse, the straw will become over-ripened, and the lint from it will be coarse and weak.

Gathering.—After cutting the flax, if labor can be got, bind it up in small bundles, about five or six inches in diameter, with the seed ends evened, and set them up on their butt ends, in small shocks to dry and cure the seed. But when labor is too scarce, or the flax very short, it may be cut and cured loose and tangled, like hay; and the seed be removed by a threshing-machine for tangled straw. It is not necessary to keep the straw straight after the seed ends are removed.

Preserving.—When the flax straw is perfectly dry, and the seed ripened, stack the straw carefully and compactly, covering it with other straw or slough grass, so as to turn rain thoroughly.

Threshing.—"With a flail," say the Germans around Chicago, who have raised some of the finest crops on record; but the larger number of people are for "treading it out with the horses," or a machine. Those who have tried it, report no difficulty in using the machine, with some slight alterations to suit better the nature of the crop. Undoubtedly treading out will be the handiest and most economical to farmers, unless they cultivate a large amount, when a machine could be used to advantage. There is one thing, however, to be considered, which is now of much importance; that the machine will give you tangled flax, which, for manufacturing purposes is always of less value than straight. In this matter, the good sense and peculiar circumstances of each farmer must control his judgment.

Rotting the Flax.—After threshing out the seed, the flax straw should be dew-rotted within the months of September, October, and November, about six weeks being required to dew-rot. Two coats of flax may be dew-rotted on the same ground, one after the other in the same season. In dew-rotting, the flax straw should be spread out evenly on grass land, without tangling, at the rate of one to one and a half tons to an acre. While dew-rotting, and when the upper stalks appear nearly well rotted, turn the flax over, picking open all the bunches. It should be taken up as soon as it is found to be dew-rotted just right, and is perfectly dry. To ascertain when it is rotted right, take a few of the stalks of flax and rub them smartly between the hands. If the lint separates freely from the broken stalks, and is strong, it is well dew-rotted. Great care should be taken not to over-rot the flax, which destroys the fiber. It should then be either put compactly in stacks, raised from the ground, and well covered, or hauled to the flax mill, and there be stacked in the same manner, or stored in the flax mill or barns. The greatest care is required to have the flax straw perfectly dry when stacked or stored, and afterward, until it is worked into lint at the flax mill, as clean, good tow can not be made from it, if at all damp. The value of tow made from damp straw, is from two to five cents per pound less than that made from the same quality of dry straw.

Cleaning the Seed.—This is an item in raising flax that must have more attention from our Western farmers than it has hitherto received. Until the past few years, the makers of fanning mills had little or no experience with it, and so

furnished no screens suitable; now, many of them furnish flax screens, with which a large amount of the foul seeds is removed. The difference in price between lots belonging to different parties, is mainly determined by the manner in which it has been cleaned by the farmers.

Yield.—The average yield of seed may be stated at eight to twelve bushels per acre; its market value ranges from \$1 50 to \$5 a bushel. In 1863, clean seed for planting sold from \$4 50 to \$5. The yield of straw is one and a half to two and a half tons per acre, an average of one ton of rotted straw giving two hundred and fifty pounds of lint and one hundred and fifty pounds of tow. The tow sells at \$1 to \$8 per hundred; the lint at ten to twenty-five cents a pound. Taking the run of seasons, flax is as reliable as any other crop.

Linseed Oil and Cake.—Linseed oil is the oil obtained from flax seed, and "cake" is the residuum left after the oil is expressed. The oil is an article of commerce, and is much used by painters. Linseed is used in the economy of the farm, for feeding cattle, and other purposes. A bushel of linseed averages in weight about fifty-one pounds; this weight, when crushed, produces about a quarter of its weight of linseed oil, and the remainder is cake. The cultivation of flax for the seed alone has become an important item among the farmers of the West, some having twenty or thirty acres under culture. The establishment of oil mills in our Western cities makes a home market, at a price that pays well for the cultivation, even for the seed alone. Linseed cake is a well known and valuable article for the food of live stock, almost equally good for cattle, horses, sheep, and hogs. One thousand parts of it, according to DAVY, contain one hundred and fifty-one parts of nutritive matter. We have treated of its quality as food, under the head of "Feeding."

A correspondent of the *Cincinnati Gazette* urges a protective duty on the importation of jute, in order to bring into use the flax tow made from tangled flax straw, which is now thrown away all over the West. Flax is raised by many farmers in the West, but almost exclusively for seed. "In the States of Ohio, Indiana, and Illinois, there has been enough flax grown in some years—had it been manufactured—to have supplied the whole United States with the coarser fabric. But only a small portion was saved and dressed into tow, and that is now a drug upon the market.

Some of it can be bought in Cincinnati to-day for 1½ cents per pound. During the last thirty or forty years there have been upward of \$5,000,000 invested in machines and buildings to dress and prepare for market this flax tow. But to-day there is hardly a flax tow mill in operation in the West, for the reason that there is no market for the stock. Yet we pay \$12,-000,000 in gold for a poorer article."

There have been many experiments to develop the use of flax as a substitute for cotton, and Congress appropriated \$20,000 for investigations; but little progress has been made toward that end.

Grass and Hay.—"Grass," says Professor MARTYN, "vulgarly formed one single idea, and a husbandman, when he is looking over his inclosure, does not dream that there are upward of three hundred species of grass, of which thirty or forty may be present under his eye." The hay crop of the United States is second only to the corn crop, having been, in 1860, 20,000,000 tons, valued at \$300,000,000. Of this, eleven-twelfths was cut in the Northern States. Most of the South does not grow grasses for hay, because much of its stock winters without it, and the remainder needs but little.

"The time has not yet come," writes N. C. MEEKER, agricultural editor of the *New York Tribune*, "when farmers appreciate grass as they should. If I wished to buy a farm for my posterity, which would continually increase in value, I certainly should choose it in the region of grass. For I do know that during the course of one's life, a grass farm will bring more money and comfort, and with less work, than any other farm, whether on the Sciota, the Wabash, or the Mississippi bottoms; nor can a farm of equal value be selected and made anywhere within the belt formed by the tropics, the whole world around."

In choosing the mixture of grass-seeds most valuable for the farmer's soil says CUTHBERT JOHNSON, many considerations must be taken into the calculation; not only the nature of the soil, and the supply of water to which its habits are the best adapted, but also the objects which the farmer has in view. Thus, the meadow fox-tail, although an early, nutritive, and productive grass, requires more than two years to arrive at perfection; it is therefore better adapted for permanent pasture than the alternate husbandry. And then, again, the meadow cat's tail, although remarkable for producing the

most nutritious culms of all the grasses, and that, too, in a considerable bulk, yields rowen of very little value. Valuable, therefore, as it is for hay, it is of little consideration for feeding purposes, if sown by itself; it must be combined with other grasses. So, the cock's-foot, which soon arrives at perfection, and yields early and late a profusion of leaves, which are highly nutritive, has culms or stalks of little value—it is a grass most profitable for feeding purposes. "Under these different relations, therefore," says Mr. G. SINCLAIR, "a grass should be considered before it is absolutely rejected, or indiscriminately recommended."

Relative Nutritment.—"The knowledge of the relative nutritive matters contained in different grasses will, also, be a highly important object of research as connected with their feeding properties. The following are some of the general results of the observations of SINCLAIR:

1. Grasses which have culms with swollen joints, leaves thick and succulent, and flowers with downy husks, contain greater proportions of sugar and mucilage, than those of a less succulent nature.

2. When this structure is of a light glaucous color, the sugar is generally in excess.

3. Grasses which have culms with small joints; flowers pointed, collected into a spike, or spike-like panicle; leaves thin, flat, rough, and of a light green color, contain a greater proportion of extractive matter than others.

4. Grasses which have culms furnished with numerous joints; leaves smooth and succulent, flowers in a spike, or close panicle; florets blunt and large, contain most gluten and mucilage.

5. When this structure is of a glaucous color, and the florets woolly, sugar is in the next proportion to mucilage.

6. Grasses which have thin flowers in a panicle; florets pointed or awned, points of the culm smooth and succulent, contain most mucilage and extractive.

7. Grasses with flowers in a panicle; florets thinly scattered, pointed, or furnished with long awns; culms lofty, with leaves flat and rough, contain a greater proportion of saline matter and bitter extractive.

8. Grasses with strong creeping roots; culms few; leaves flat and rough; flower in a spike, contain a greater proportion of bitter extract with mucilage.

In the first part of April 1820 grains of the leaves of the following grasses, etc., afford, ac-

cording to SINCLAIR, the following proportions of nutritive matter, in the varieties of prominent English grasses named :

	Gr.		Gr.
Meadow fox-tail grass.....	9	Perennial rye grass.....	70
Tall oat-like soft grass.....	130	Fall rye.....	91
Sweet scented vernal.....	50	Meadow fescue.....	96
Round panicked cock's-foot.....	80	Crested dog's-tail.....	88
Woolly soft grass.....	80	Wood forin.....	62
Creeping soft grass.....	90	Yellow vetchling.....	40
Thy or herd's grass.....	80	Rough-stalked meadow grass.....	80
Fertile meadow grass.....	70	Broad-leaved red clover.....	80
Nerved meadow grass.....	70	White or Dutch clover.....	14
Smooth awnless brom.....	84	Common quaking grass.....	54
Wood madow grass.....	68	Greater bird's-foot trefoil.....	60
Smooth fescue.....	70	Long-rooted clover.....	76
Long-stawed sheep's fescue.....	100	Lureth.....	90
.....	100	Barnard.....	100
.....	100	.....	100
.....	42	ow parsnip.....	90

It may not be uninteresting to the cultivator to learn of what these nutritive matters consist: the following is the result of Mr. SINCLAIR's examinations:

100 grains of the Nutri- tive Matter of the	Mucilage or Starch.	Sacch. Matter or Sugar.	Gluc- ten.	Bitter Extract. and Saline Matters.
Meadow fox-tail con- sist of.....	61	8	—	28
Meadow fescue.....	59	20	—	20
Rye grass.....	65	7	—	24
Meadow cat's-tail.....	74	10	—	16
Cock's-foot.....	59	11	—	30
Meadow cat.....	80	10	—	10
White clover (in flower)	17	2	7	14
Red clover.....	79	8	5	8
Timothy.....	68	23	—	7
Floria.....	55	5	—	40

Varieties.—The botanical family of grasses (*Graminæ*) includes almost half of the vegetable kingdom—not only comprising the tender meadow growth, but also, rice, the cereals, Indian corn, sugar cane, and even the bamboo cane that frequently mounts almost a hundred feet into the air. We shall here treat only of those grasses which are cultivated and reaped for cattle food. Familiar names will be used, and technical and botanical phraseology omitted.

Timothy.—This is sometimes called herd's grass, and is the meadow cat's-tail of England. It is, however, better known as timothy, from TIMOTHY HANSON, who introduced it to public notice. It is the favorite grass raised in the United States, both with farmers and their stock. It is a perennial, likes best a moist fertile clay loam, and is found in the highest perfection in the Northern States. It is hardy, grows rapidly, and yields, in its favorable moods, from one and a half to four tons per acre. It makes the most succulent food for dairy purposes and young stock when cut just as it goes into flower, but SINCLAIR estimates that it has not, at that period, attained more than half the nourishing value which it possesses when cut later.

Two-thirds of the hay which enters into the commerce of this country is made from this grass. It has greater weight and more nutriment in the same bulk than any other kind. Its great yield, its adaptation to land too moist or wet for grain crops, the time of its maturing being after the grain harvests, and the continued growth of nutritive elements in the blade, and in the stalks during and after the flowering and ripening of the seed, make it the best of our grasses for hay. Cut at the time when it retains the ripened seed, it unites more than other grasses the nutrition of the seed with an undiminished value of the stalk and the leaves. Its defects are, that it does not start early in the Spring, that the aftermath grows slowly, although it is very nutritious, and that when fed alone as hay it is binding from its heating qualities. For the farm stock, it is best to feed it with other less heating foddering substances, as corn fodder or clover hay.

It may be sown with wheat in the Fall or Spring. ALLEN says, "from its late ripening, it is not advantageously grown with clover, unless upon heavy clays which hold back the clover. I have tried it with the northern or mammoth clover, on clay, and found the latter, though mostly in full blossom, still pushing out new branches and buds, when the former was fit to cut." In seeding, give from fifteen to twenty-five quarts to the acre, the latter on stiff dry soils. Timothy is rather more liable to winter-kill than many other varieties of grass, and it requires frequent renewal.

June Grass—(*Kentucky Blue Grass*).—Is a native of our soil; among the earliest of the grasses; makes a thick sward; stands the cold; is not very sensitive to drought; and sticks to a field from year to year with great tenacity. It reaches its best condition on a fertile upland, and leaves a heavy aftermath. This is nearly or quite identical with the Kentucky blue-grass, and in that State it grows with an astonishing luxuriance, covering the ground with a density of delicious herbage that is not equalled in any other State of the Union.

Orchard Grass—(*Cock's-foot Grass*).—Is indigenous, and for shaded, fertile soils, is very profitable, growing four or five feet high, and yielding, sometimes, five tons to the acre. It thrives in every State of the Union. Its nutritive value, is generally considered less than other prominent grasses; being about two-thirds that of timothy, by the ton. It is somewhat grown for hay, but its chief value is in the rapid growth and sweetness of its rowen for pasture. It

ripens and is cut at about the same time as clover. ALEXANDER HYDE, a prominent farmer, says of this grass: "It gives two fine crops each season, in June and August, the second being very nutritious and even better for growing stock than the first. The cattle eat it clean and prefer it to any other hay." In good condition, into the middle of Autumn. If cut and given to the milch cows, from its succulence and nutritious qualities, it would greatly add to the yield and quality of the milk and butter, and thereby increase the revenue of the dairy."

Red Top.—Flowers abundantly; is hardy and prolific; grows well on almost any moist soil; and is relished by cattle when carefully cured. ROBINSON thinks it is more acceptable to working oxen than to any other stock. It is not half as valuable as timothy per acre.

Meadow Fox-tail.—Very early, tolerably nutritious, and a luxuriant grower. As a food it is a favorite with stock of all kinds. As a grass, it establishes itself slowly, but when once rooted over a field, may be considered permanent. It prefers a moist loam; is about half as valuable as timothy, and is better for pasture than for hay. This is quite different from that pestilent fox-tail of the West which is known as "a necessary evil," and which cattle dislike as food.

Fescue.—The blossom of the meadow fescue is a sort of cross between that of red top and that of rye grass. There are half a dozen varieties of the fescue; all of them early, and of about half the value of timothy.

Hungarian Grass—(*Millet*).—This is a tall grass, topped with a bushy fox-tail, somewhat like timothy. It is very vigorous, grows with the greatest luxuriance, and is almost insensible to the severest droughts. It requires rich soil, and the land that carries it will need constant fertilizing. It seems admirably adapted to the rich prairies of the West, and upon the more porous soils, it seems likely to supersede timothy almost entirely. It especially delights in a warm sun, and a sandy or loamy soil, but is adaptable, and will thrive under serious disadvantages.

The *Farmer and Gardner* says: "The more experience we have with this production, the better are we pleased with it, and the fact of the deficiency of the pastures, the present season, urges us to suggest the propriety of farmers introducing its culture into their respective systems of husbandry. How fortunate would it be for those who are now compelled to feed out their Winter stock of hay, had they flushed up a few acres of their harvest fields, after the grain was cut off, and put it down in millet, to cut and feed to their stock. Two acres of it in good ground, would yield grass enough to soil twenty head of cattle six weeks, and carry them

As a universal substitute, millet deserves to be first named, though in some parts of the United States it is likely that other plants can be substituted to better advantage, to supply the loss of the hay-producing grasses. Millet, however, if sown upon dry ground, in June, or even the first of July, with just rain enough to vegetate it, will mature in about eight weeks, and yield two or three tons of good fodder to the acre. As soon as the farmer finds his hay crop will be cut short by the drought, he should plow up the most available piece of land he has, and prepare the surface well with the harrow, and while the ground is as fresh as possible, sow half a bushel to a bushel of seed to the acre, and harrow in.

The proper time to cut the millet for hay is when the blades begin to turn yellow, or when the seed is just passing out of the milky state. If allowed to fully ripen the seed, the hay is not so rich and nutritious, while the harsh seeds frequently injure and have been known to kill horses and sheep, forming hard balls in the intestines. It will grow three to five tons to the acre, and should be cured in the cock, like clover. Cattle are very fond of it, either as soiling, or when cut in a machine.

There are numerous other familiar grasses, which it is not necessary to describe—such as the rough-stalked and smooth-stalked meadow, rye grass, pony grass, English bent, oat grass, sweet-scented vernal, foul meadow, wire grass, and prairie grass—besides some kinds of which the less there is known the better.

Clover.—Clover is not properly a grass, as it is a member of the family of leguminous plants, classing with the bean, pea, vetch, etc. But it seems naturally to belong with this branch of foraging, and we shall admit it here. Naturalists have detected more than one hundred and sixty species of clover; the attention of farmers needs to be called to but very few—the common red clover, the Southern clover, the white clover, and the scarlet clover. Of these the common red is most cultivated.

Clover requires a fertile soil; but it returns to the earth more than it extracts, and as a fertilizer it is placed far above every other species of vegetation. Of this we have treated under the head of manures.

Wheat thrives wonderfully after clover, and is generally healthier than when fertilized with any other manure. "Strike this plant out of existence," says GEORGE GEDDES, "and a revolution would follow that would make it necessary to learn everything anew in regard to cultivating our lands." Its nutritive elements are somewhat less than those of timothy, but it is regarded as fully equal to it, in consideration of its relative product and expense, and the fact that it both pulverizes and enriches the soil.

Lucern is another of the substitutes for hay, and its merits seem to be but little known. It affords a larger produce of fodder than any other species of artificial grass. The stems are two feet high, and nearly erect, the leaflets oblong, the flowers in clusters, and the fruit a spiral legume. It is adapted to almost any climate below 42°, and prefers a dry warm soil. Its roots strike deep, like the clover. It is commonly cut several times in a season, and the yield is enormous. Chancellor LIVINGSTON, one of its first American cultivators, harvested six and a half tons of dried lucern to the acre, the aggregate of five cuttings.

In England, thirty to forty tons of the green forage are sometimes cut from an acre, per year, though ten to fifteen are a common yield. STEPHENS, in the *Book of the Farm*, writes: "*Lucern* is particularly calculated for horses, though pigs will greedily consume the refuse that comes from the stables and thrive well upon it; but it is too strong in the stalk for cows, and by no means so good for them as tares. If cultivated upon proper soil, *an acre will keep three strong cart horses from 1st May to October*, and after the first year may be mowed twice or thrice."

It should be cut when in bloom or just before; the first time about the middle of May, and every thirty days thereafter. Where lucern thrives, it is fit for cutting a fortnight earlier than red clover. Not only is it ready for the scythe earlier than any other forage plant, but it grows stronger and heavier each successive year. WILLIAM PEPPER, an English farmer, who grew it largely, states that, after years of mowing and manuring it, he has got as much as twelve tons per acre (dry forage), and that it is hardy and will endure cold, if cultivated in dry soil. He has seen it green and succulent when all the other grasses were burnt up—running to a height of five feet and five inches in a hot summer.

"Upon the whole," says the *English Agricul-*

tural Quarterly, "lucern is a plant of the utmost value; for if the seed be good, the ground rich and in heart, and rendered deep in the first instance by a thorough trenching, the young plants start into lively growth, attain strength in the shortest possible time, and yield a bulk of luxuriant herbage that can not be surpassed. If the plant require four years to attain its maximum of power, it is still a giant even from its infancy, advancing from strength to strength." Lucern may be estimated as the choicest of all fodder, because it lasts many years; will bear cutting down four, five, or six times a year; enriches the land on which it grows; will fatten cattle, and often proves a remedy for the diseased.

Hon. JOHN S. SKINNERS, one of the wisest of the pioneers of American agriculture, said of lucern: "*As a soiling grass*, it has no equal, being the earliest in Spring, and latest in the Fall—it promotes the secretion of milk, and imparts a rich and delicate flavor to butter. As a dairy grass, it stands peerless and alone, o'ertopping all other grasses full a head and shoulders. Those who may desire to have a lot of grass to cut to be fed green to their stock—and all should do so—should not omit to prepare an acre or two, and sow thereon lucern, at the rate of twenty pounds per acre. The best way is in drills a foot apart, though if the ground be properly prepared, it will do well-sown broadcast. To succeed in the latter method, the ground should be plowed at least twice. After plowing the first time, it should be harrowed and rolled; suffered to remain until the weeds spring up and have attained a few inches in height, when the ground should be manured liberally, plowed deeply, and thoroughly pulverized, by repeated harrowings. Then soak the seed in warm water for twelve hours, drain off the water, dry the seed in ashes, and sow it—after which it must be lightly harrowed in and the ground rolled." Plaster is a special manure for lucern, the stalk containing considerable gypsum.

Alfalfa is also somewhat cultivated among the substitute grasses, especially for soiling cattle. It is a rank grower, and gives several crops a year.

Lupine is moderately used for soiling, but is raised more frequently for a green manure. It grows fast, is a thorough pulverulent, and is very hardy.

The Vetch is a running plant of the leguminous species, resembling the pea. Sown in April, it will be found ready to cut the last of

June, and will probably be found valuable in a regular soiling course. It enriches the soil, and sheep and horses fatten upon it faster than on clover. JOHN WILSON, author of the article on Agriculture in the *Encyclopedia Britannica*, says, "There are other forage crops well worthy the attention of the farmer, but the vetch is less fastidious in regard to soil and climate than any of them, and can be grown successfully on very poor soils." It is probable that any farmer, having moist arable land, can raise a good crop of vetches, merely by sowing them broadcast, three bushels of vetches with one of oats. The oats are added to sustain the stems of the vetch, which otherwise would lie upon the ground, and a great part of the crop might rot. The weight of a full crop of vetches, if the two cuttings be weighed green, will be found nearly equal to the weight of a crop of cornstalks.

A New Clover.—H. W. RAVENAL, of Aiken, S. C., in 1867, presented to the Academy of Natural Sciences, specimens of a new plant, which botanists know only as the *Lespendozu Striata* of China, and of which a correspondent of the *Tribune* thus speaks: "I send a specimen of a new species of clover, supposed to be from China, which first became plentiful in 1862. It seems indestructible, the closest grazing does not destroy it, and last year during nine weeks of drought, it only withered and turned yellow, and revived on the first shower. The cattle are very fond of it. It has covered the entire country with a dense growth and seems to choke out all other kinds of grass. The specimen I send grew on the red, bare hill-side. It was necessary to wrench it from the soil. On good ground I have seen it two feet high."

Bunch Grass.—Attempts are making to introduce east of the Mississippi, the bunch-grass, which the emigrants to the land of gold find so nutritious for their cattle in crossing the Rocky Mountains. It grows on hill-sides, preferring pebbly and sandy soils, producing a seed like the oat, and a stalk which contains abundance of saccharine matter. The dry Summers on the mountains ripen it in May or June, and the hay on the stalk remains good all Winter, till the following year. It is said to give the flesh of meat cattle a fine flavor.

When to Sow Grass-Seed.—The editor of the *Rural American* says; "Probably ninety-nine farmers in a hundred sow all their seed in the Spring, the usual way being to seed

down with a crop of oats; but grass-seed may be sown in September, in many cases to much better advantage than in the Spring, and the next season a good crop of hay will be the result of such sowing, in all cases when no other crop is grown, and frequently when such seeding is done when sowing wheat."

Says an intelligent writer in the *New England Farmer*, "We may conclude that the result of sowing grain and grass together is to injure both crops, and very often to lose the grass entirely. Such loss and vexation may be obviated by sowing the grain alone in the early part of the Spring, with such manure as has been allotted to the field; and as soon as possible after the grain has been harvested, to plow the stubble in with a deep furrow, that the stubble may have a chance to molder away, which the showers that take place about that time, and the heat of the weather, will generally bring about in the course of ten or twelve days. Before the end of July the field should be cross-plowed, the grass-seed sown on the furrow, harrowed and rolled in. It is of much importance in this part of the process to avoid any delay, and therefore it is quite needful to put in the grass-seeds, even if the weather should happen to be dry at the time. They will lie safe in the ground, and be ready to improve the benefit of the first showers, when the grass will soon appear, and generally make a good progress before Winter sets in. If the Winter should prove favorable, nothing further is wanting to insure a good and lasting field of grass, than to draw the roller over it in the Spring, as soon as the frost is out of the ground, which will settle the roots of the young plants, which would suffer from exposure to the sun and the wind."

The *Cultivator* says: "It requires more labor, but is enough better to repay it, to prepare the land late in Fall, and sow grass very early in Spring, with nothing else. If well seeded on a rich soil, the young plants will quickly spring up, and soon be out of the reach of drought. It will make a good crop the first year."

In YOUNG'S *Farmer's Calendar*, under the date of August, it is said: "This is the best season of the year for laying down land to grass; and no other is admissible for it on strong, wet, or heavy soils. Spring sowings with grain may succeed, and do often, but that they are hazardous, I know from forty years' experience."

The best mode, says W. C. CAMPBELL, in

the *Prairie Farmer*, of getting a wheat field set in grass, is to sow it in March, the sooner the better, one peck of timothy, with a considerable sprinkling of clover, to the acre, will be very apt to get a set if the season should be favorable. I have had some experience in sowing grass on the prairies, and find early Spring the best time to sow, and that when the ground is frozen, and, better still, when there is snow on the ground—then the sower can see where he has sown, and will not leave strips with no grass on. When the ground thaws, the seed will sink deep enough in the ground to grow with the first warmth of Spring. I always have the best set when I sow on the land where there is no other crop to come off the same season, as I have always found that it does not pay to try to grow two crops on the same land at the same time, for if the oats or wheat, or whatever it may be, should be very thick, the young grass is smothered out, or in a very stunted condition, and when the ground is cleared of the oats or wheat the hot sun of August will frequently kill it; but I would sow with wheat sooner than any other crop, as it is not apt to be so thick.

On low lands, which are too wet for any crop but grass, as our seasons generally occur, it is better to prepare the ground, and sow the grass-seed without any grain. Worn out lands do well when thus prepared, without any manure, for two or three years, when the process should be repeated, and so on for successive periods. "We have seen land taken up and thus prepared," says a correspondent, "where not more than one-fourth of a ton of hay had been mown on the acre, and by simply being well plowed and sown down with herds-grass, produce two tons first quality hay for the market. The second year the crop would be lighter, and the third still less, when the ground would be again plowed and sown, but with still better success than the first trial."

How much Seed to the Acre?—An English authority gives the following statement of grass-seed required per acre: Millet, one-half bushel; white clover, four quarts; red clover, eight quarts; timothy, six quarts; orchard grass, two bushels; red-top, one to two pecks; Kentucky blue-grass, two bushels; mixed lawn grass, one to two bushels; rye-grass, twelve quarts." We are certain that this is too thin seeding. *The Annual Register of Rural Affairs*, which is high authority, says that "it has been found by careful counting that a foot square of rich old pasture, composed of mixed

grasses, contains about a thousand plants; and some highly enriched and irrigated meadows have contained nearly twice that number. This is seven to twelve plants to a square inch." Now there are in a bushel of clear seed:

	Seeds.	See-1g.
Timothy	40,000,000	Meadow fescue.....25,000,000
Orch. r. l.	7,000,000	Red clover.....15,000,000
June grass.....	15,000,000	White clover.....20,000,000
Red-top.....	70,000,000	

There are about six million square inches to the acre. Now, how much will you allow for failures to germinate?—and how many roots will profitably grow up on each square inch? From the basis of the above table a calculation can be made, which will only need to be slightly varied to suit the soil and the conditions of the crops. Many of the best farmers are satisfied that a thicker seeding than usual would be beneficial.

The depth of covering should not be any less nor much more than one-fourth of an inch; when covered an inch or two not half the seeds will ever re-appear. In smooth, mellow ground, rolling will be found to cover sufficiently.

When to Cut Grass?—The answer to this question depends on circumstances—especially on the answer to another question. What do you expect to do with your hay? If it is to be fed to working oxen or working horses, it should generally stand until two-thirds in blossom; if to milch cows, calves, and sheep, it should, undoubtedly, be cut considerably earlier—before much of it passes into flower. There are some advantages attending both late and early cutting. Grass that is cut green certainly exhausts the land much less, and is more savory and toothsome to stock of all kinds. Properly kept, it carries much of its original sweetness and aroma through the Winter; and it is well-known that food that is taken with a relish always does more good than that which is worried down.

On the other hand, it is believed by stage companies and large livery owners that ripe grass makes the strongest and heartiest hay. The reason for this last opinion is, that the road horse that eats more grain than hay requires ripe hay or straw to extend the stomach and prevent too rapid fermentation and passing off of the food through the stomach and bowels, and to supply the waste of muscular tissue from severe exercise. Ripe hay or straw contains more silica than grass does, so it probably is better to supply the muscle of a horse. The New York men rely upon the nutriment

in the grain they feed for keeping up the condition of their horses, and the ripe hay to serve as a divisor for distending the stomach.

Moreover, grass will very soon run out if cut before any of its seed ripens. SINCLAIR'S analysis shows that ripe hay contains thirty per cent. more nutriment than immature hay; while Professor WAY'S analysis convinced him that grass mowed just in flower was at the maximum of value. J. STANTON GOULD, of New York, holds that "when grass is allowed to ripen its seed, the straw is converted into woody fiber, is indigestible, and its nutritive value very much lessened."

Clover should be cut when it is turning from the fullest bloom. The fact is, that no large farmer can cut all his hay at a particular time. Let him begin so that his mowing machine will be off the field by the 25th of July, and there will be difference enough between the earliest and latest, if kept somewhat separate, to feed what is best for different kinds of stock. DONALD G. MITCHELL lays down a safe rule: "The milkman's haying should commence a fortnight before the grazier's, and end a fortnight earlier."

How much to Cure Hay.—There is even more diversity of opinion on the question whether grass should be cured much or little than there is as to the time of cutting it. All agree that clover may be put up with less curing than finer grasses, for the reason that it will not pack as close in the mow, giving more circulation of air through it than any other hay. Farmers are gradually coming to the conclusion that grass of all kinds is ordinarily *cured too much*. Captain WILLARD, Warden of Connecticut State Prison, says he does not dry clover in the sun, but puts it in cock and turns it over two or three times the first day—the next day he turns the cock bottom side up and takes it to the mow, putting about four quarts of salt into each load. The salt keeps the hay from molding and makes it more nutritious as well as palatable. The best farmers turn their clover out to the sun as little as possible, leaving it in the cock a day or two, and storing it without hustling it about. All the heads and leaves, and most of the seeds are thus saved, and these are worth more than the stems. For new milch cows in the winter there is nothing better. It will make them give as great a flow of milk as any hay, unless it be good rowen. Clover need not be left in the cock long enough for the outside to blacken; for clover, like the grasses, is generally overcured.

T. S. GOLD, Secretary of the Connecticut Agricultural Society, gives it as his opinion, strengthened by observation and experience, that it is better to cut grass with the dew upon it, put in a tedder immediately and cock about noon. Let the hay remain until the next day, shake it up well and put it under cover before night. Others mow as soon as the dew is mostly off, start the tedder at ten o'clock, begin to cart just after dinner, and get it all in before night, when the weather is favorable. In a warm day, this method should be preferred to all others. The result of this one-day curing, followed safely even with clover, is, that we have in the Spring of the year seen clover in a well ventilated barn, cut the previous Summer, the honey candied, the heads blushing as if just mown, and breathing as delicious an aroma as when taken from the field. Hay so cut will work miracles in the dairy.

The *Boston Cultivator* says: "General THOMPSON has, for some five years past, cured small quantities of hay in casks, without any drying, cut when the dew was entirely off, and closely packed in clean casks, replacing the heads again, making them nearly if not quite air-tight, and allowing them to stand in the barn until the next Spring. He has lately opened one and has favored us with a sample, and when the box containing it was opened, there gushed out such a sweetness of aroma as man was perhaps never before delighted with, and it could not be believed, in the absence of the evidence, that so highly impregnated a feed, the aroma from which could have such strength, came from so small a box. It may be observed that the scent of the sample was somewhat sickening, like that of fresh May-flowers when confined in a close room, but when laid before our animals, which had just filled themselves with fresh green grass, it was eaten with avidity." Two things are to be avoided with equal care: not to wet the hay, and not to burn it up in the scorching suns of Summer. *There is very little danger of putting hay in the barn too green.* Its color and flavor should both be preserved.

Tools.—We speak elsewhere of pruning implements, and will only say here that no farmer who cuts much hay will think of getting along without a set of muslin caps for the cocks, a hay tedder, and a horse-fork, any more than he will try to cut his meadows by hand. A patient tedder will do the work of fifteen men, and do it better than they can; a horse-fork will pitch off a load of hay in five minutes; and a

set of caps will be likely to save ten times their cost every year.

Hay-Caps.—Take strong sheeting a yard and a quarter, or a yard and a half wide, and cut into pieces of equal length, so that each cap shall be square; paint one side with a mixture of linseed oil, beeswax, and japan, in the proportion of two gallons of the oil, eight pounds of wax, and two quarts of japan for one hundred caps; the oil to be simmered with the wax until dissolved, and the japan to be added afterward. Apply with a whitewash brush or with the hand, and dry in the sun. The paint will prevent raveling, and the cap may be secured in its place by sewing up a small stone in each corner. Caps of this sort would cost about twenty cents each, and would last ten years if properly taken care of. Of course, they should only be kept on the hay during the night in fair weather, and during the storms in bad weather.

New and Old Hay.—It has been ascertained that well-cured hay, weighed in the field July 20, and then stored in the barn until February 20, had lost twenty-seven and a half per cent. of its weight. It is, therefore, better to sell hay in the field at \$15 per ton than from the barn at \$20, in midwinter.

Nutritive Value of Hay.—According to the experiments of several eminent European agriculturists, 100 pounds of good meadow hay are equal to about 90 pounds of best cured clover hay, 300 to 500 pounds of rye straw (varying with time of cutting, etc.), 200 to 400 pounds of oat straw, 200 to 300 pounds of ruta-bagas, 250 to 400 pounds of mangel wurzels, 200 to 300 pounds of carrots, 150 to 200 pounds of potatoes, 30 to 60 pounds of beans or peas, 50 to 60 pounds of Indian corn, 65 pounds of buckwheat, 35 to 75 pounds of barley, 40 to 80 pounds of oats, 30 to 70 pounds of rye, 30 to 60 pounds of wheat, and 40 to 100 pounds of oil cake.

Management of Grass Lands.—Some of the oldest and shrewdest farmers in this country hold that plowing up good natural grass lands is malpractice; that such lands need never be turned over, but that their fertility should be kept up by top-dressing of animal manure, ashes, plaster, muck, earth, or whatsoever enriches pastures almost at any time. In mowing lands this surface dressing may be applied soon after the crop is removed, that it may act favorably upon the roots and afford protection during the Winter.

Natural meadows—that is, the level land

bordering on streams and rivers—are undoubtedly best for mowing, and can usually be made smooth without even a first plowing, and are sometimes found self-sustaining; also, lands receiving the wash of hills, roads, and barnyards, often keep up their fertility without any direct application, though the hay crop is continually taken off. It is well known that a cattle-feeder can not so easily fatten stock on newly-seeded ground, as on lands put down many years ago, or that have never been broken up. A top-dressing of sawdust, in which the liquid manures have been absorbed, applied in Fall or Spring, gives great vigor and growth to grasses. It is better and cheaper to apply this or other manures to old pastures than to plow and re-seed. A volume of the Michigan Agricultural Reports gives the advice of SANFORD HOWARD on this point, thus:

“1st. That, on some soils, grasses will live so short a time that it is not an object to endeavor to continue them for permanent pastures. Such land, if suited to grain or other cultivated crops, may be brought under a system of rotation, if not devoted to forest trees.

“2d. That some soils may be kept permanently in grass by occasional scarifyings, or harrowings, with top-dressings of suitable manures, and surface re-seeding of spots where the sward becomes weakened.

“3d. That some soils which are particularly natural to grass, if once set with the proper species, may be kept in pasture for an indefinite length of time, in many cases without manifest deterioration, through fertilizers, as bones, ashes, plaster, etc., which may be advantageously applied at intervals.”

Overcropping is the chief vice of farmers in pasturing. “On late and off early” should be painted on every entrance to a pasture-field. Too many cattle on grass lands in the Spring prevent the young roots from taking a firm hold of the soil; too close feeding in Summer exposes the roots to the scorching heat of the sun; and in the late Fall, in low meadows, the cattle are apt to trample the sward so as to render the next growth of grass irregular.

A mixed husbandry is often best, especially in those sections where the land will carry more dairy cows, when partially given to grain and roots, than when it is principally kept in grass.

A. L. FISH, an experienced New York farmer, gives the following as his method of laying down to grass such lands as it is advisable to plow: “Let them be deeply and thoroughly pulverized, and as much manurial mat-

ter incorporated in the process as will amend for the crops taken off; then seed with a variety of the indigenous grasses with the usual variety of cultivated grasses, keep the herd from grazing or trampling it the first year, so that the new roots may be thoroughly interspersed through the soil before it becomes packed again, and I will risk my reputation as a farmer upon the assertion that its productiveness will be much improved, and the grass quite as succulent and nutritious as the old indigenous sward. The prejudice against re-seeding for pasturage has no doubt grown out of the fact that the tilth and manner of seeding has not been properly done. The lay and texture of land is so unlike in different localities that it would be difficult to adopt a rule of general practice without broad exceptions. Some soils require to be pulverized and packed to make them less porous—others to be pulverized and not packed to have them more permeable. All soils must be permeable to receive full benefit from the circulating elements passing through them."

Many farmers effect a speedy renovation of pastures which have become "hide-bound," and seem to be running out, by giving a moderate top-dressing of five to ten cords of barn-yard manure to the acre—or an application of ashes, plaster, lime, or any liquid manure—evenly sowing four to six quarts of new seed, and then subjecting the sod very thoroughly to the harrow. The harrow must not be spared in such case; the meadow may look as if "all dragged to pieces," but the new seeds will take the better for it, and the old roots strike out with remarkable vigor. The roller may always profitably follow the harrow where the land is not wet. Occasional pasturing, too, for a full season, is highly advantageous to mowing grounds.

Mr. FISU says: "My mode of using manure is to apply it to all crops at a season when the growing crop will appropriate it most speedily to its use, to prevent waste by evaporation, and otherwise, while vegetable growth is dormant. The very convenient way of spreading manure broadcast in the Winter season I discard as ruinous to the farmer, as the frost decomposes and prepares for excessive waste before the soil can receive it. Let any dairyman take one-tenth of his pasture land and cultivate it to grow maize for soiling, and feed it to his cows annually, and I will engage that he will have made more cheese or butter from the same number of cows, and the same area of land, and the land will have improved under the treatment, pro-

vided he makes judicious use of manures and grass-seed."

The excellence of pastures depends greatly both upon their position and the different species of animals for whose support they are intended. Thus, uplands which are elevated, open, and dry are the best adapted for the feeding of sheep. While a heavy stock is fed with more advantage upon ground which is lower in point of situation, as well as better inclosed. The soil of uplands, particularly if it be of a chalky nature, bears a sweet, though a short bite of grass, which is so favorable to the pasturage of the smaller breeds of sheep, that although it will support but a scanty stock, it yet produces the finest species of mutton.

It is well known that certain grasses are preferred by particular species of stock, and some persons on this account put different kinds of animals at the same time on their pasture, but it is difficult to proportion the different numbers, especially as they will all agree in cropping the sweetest herbage first. It appears most injudicious to congregate different classes of animals, as they are apt, from their respective habits, to interfere with the comforts and repose of each other. Horses and cows do not mingle sociably together, nor eat exactly after the same mode; but horses and sheep, both biting closely and quickly, are fit followers together after a leading stock.

Clover-Seed.—Western farmers are beginning to imitate their Eastern brethren, in considering the importance of saving clover-seed. "The saving of this seed for market," says the *Valley Farmer*, "has heretofore been chiefly confined to three or four States, and the constantly increasing demand is now beyond their ability to supply, and consequently, the price has become a heavy burden upon the farmer; and however great this tax may be, few good farmers will consent to exclude clover from their rotation of crops, because they must either substitute manure at a still greater cost, or consent to see their land lose in fertility." On a small scale, it will be fully as remunerative as wheat growing. It is a new thing to many farmers to save the seed; but it is a simple process. The clover should be cut with a mowing machine when the heads are two-thirds brown, and cured and handled with care. Only a threshing machine and a clover-huller are required afterward.

A farmer in Illinois gives the following result of his experiments in saving clover-seed. The last week in June and the first week in July, he says he cut and stacked seventy large

loads of hay from twenty acres of ground. In September he cut over the same piece of ground for seed. This was threshed and hulled, yielding *eighty* bushels of clean seed. He estimated the hay to be equal to fifty tons, worth \$8 per ton, or \$400; 80 bushels of seed at \$8 per bushel, the present market price, \$640; making in all \$1040. Besides the hay and seed, there are many tons of clover roots left in the ground, worth, as manure, twice the cost of the seed sown. Now, even if half of this can be obtained, it will then be as profitable as the best farm crop usually grown.

In a late number of the *Ohio Cultivator*, Mr. E. R. WHITAKER, of Clinton county, states that he had a field in clover, containing ten and a quarter acres, from which he made two tons of clover hay to the acre, estimated to be worth \$246. From the second crop he saved the seed which yielded $42\frac{1}{2}$ bushels, which he sold at home at \$7 per bushel, amounting to \$299 25—which added to the value of the hay, makes the handsome sum of \$545 25.

Plaster upon Clover.—With the exception of a small district near the sea-shore, clover is greatly benefited by the application of plaster. About one bushel to the acre is, perhaps, the most suitable quantity. Apply it upon a moist day, early in the Spring. Ammonia is constantly brought to the earth by dews, rains, or snow, and the plaster acts as a collector of this fertilizing matter, and preserves it for the use of the plant.

STACKING in America is generally considered as necessarily wasteful, and to be avoided as long as there is a foot of barn-room unappropriated. In England, it is preferred, as being more economical than any other method of storing either grain or hay, because freer from rats and mice, and better ventilated. There, stacks are skillfully and scientifically constructed; here, they are thrown together in a slovenly manner that invites damage from the elements. There is more science, says an intelligent writer on this subject, involved in building a stack of hay, loose grain or bundles, in a correct manner, than there is in erecting a pyramid that will stand the test of wasting and raging elements, of time and of changing weather. The main point is to build a stack so as to turn all the rain off instead of turning it toward the middle of the stack, where it would produce more or less damage. Beginners will almost always commence at the circumference or outside of the stack instead of

commencing in the middle. Whether a stack is to be made of bundles or loose material, it should always be begun in the middle, and the middle should be always kept fullest—from one to two feet higher than the outside, and well pressed down. The middle should always be trod down more closely than the outside, so that when the stack commences to settle, the outside will settle more than the middle, and thus tend to give a good inclination to the straw on the outside, and carry off the water rapidly.

A stack should be constructed in a circular form on the ground, and should always be built in the shape of a hen's egg, small end up, with the bulge extending two or three feet beyond the circumference at the base. It will pay to thatch every stack, so that it will shed rain like a roof. Here is a simple and easy method: begin at the "eaves," and push vertically into the stack the ends of long grass or straw, and so continue until the other ends hang in a fringe around the stack. Then begin again, and form another course a foot above, and so on until the pole or apex is reached, where finish off carefully so that all rain will be shed down the roof. Such a thatch will sometimes keep a stack sweet year after year. The bottom of a stack should always be made of rails crossed, or stout brush.

Ventilate the Hay.—Ventilation will keep hay, even when it is put up half cured. SOLON ROBINSON recommends that all barn "bays" be ventilated, not only underneath, but from bottom to top, by a sort of chimney, made of four tall poles, set so as to form a square, and connected with rounds like a ladder. He saved a green stack by a flue of rails, and a prairie-hay rick by "an air tube of brush." The English have a simpler flue, which they make as follows: They fill a large bag, say three and one-half feet high and twenty inches in diameter, with straw, and place it vertically in the center of the stack, putting the barley, oats, or hay—whichever it may happen to be—around it. As the stack rises, they lift the sack; and so on until near the top, then lay some rails across it, leaving them to project beyond the side of the stack, and finish off the dome in the usual manner above. This mode of ventilation would also be most effective in hay mows, and the flue could be left open.

Hemp is a diœcious annual of the nettle tribe, cultivated for the value of its fiber as a fabric for ropes, and bagging. The seeds are

also serviceable for fattening purposes, when fed moderately, containing thirty per cent. of oil. Its leaves are strongly narcotic, and in the eastern climates are used like opium, and smoked like tobacco. Hemp seems to have come to us from India; but the Russian Empire is by far the largest modern producer.

In America the staple and its fabrics are largely supplied by importation, as its growth as a staple has been mainly limited to Kentucky and Missouri, the first named State having raised forty thousand tons of fiber in 1860; but it is now being introduced into the newer Northwestern States as a crop which is in great demand. Their climate is well adapted to its cultivation, as it requires hot, quick, forcing seasons. The hemp plant needs for its growth a fair, highly manured soil, but it is not particular as to the quality. Old deep meadow lands, all rich alluvial, and even peaty soils, are adapted to its growth. In turning under a green sward, the ground should be plowed and thoroughly harrowed, or cross plowed, to reduce it to as fine a tilth as possible. A fine soil is as much needed as in flax culture.

It takes fifty tons of hemp to rig a man-of-war, or the crop of at least one hundred acres. The price of hemp averages about five cents a pound, passing into the hands of the first purchaser.

L. J. BRADFORD, President of the Kentucky State Agricultural Society, apprehends² that the seasons are too short in Minnesota, Wisconsin, and Iowa, for the successful growth of seed, a defect easily remedied by the purchase of seeds grown in more southern latitudes, but not a shadow of doubt exists in his mind that they can, at the very first effort, produce better hemp than any territory south. Time, he thinks, will demonstrate that Illinois, Iowa, Minnesota, and Wisconsin compose the TRUE HEMP REGION of the American continent.

Culture of Seed.—The first step in hemp culture is the production of good, sound, plump, seed. Land intended for seed must be in good tilth and well prepared by early corn-planting; it should be laid off in straight rows, four feet apart each way, and planted in hills seven or eight seeds to the hill; the same rules observed for cultivating corn will apply in the after culture of hemp-seed; when the plants reach the height of six or eight inches, they should be thinned to from three to four plants.

Hemp plants are divided into male and fe-

male, the former producing the pollen or impregnating powder, the latter bearing the seed. A very little observation will enable the grower to distinguish between them. As soon as the distinction can be made, the male should be drawn up by the root, except here and there a solitary one left that the female plant may be properly impregnated; the female is to be retained until its seeds are perfected, when it is to be harvested by cutting at the ground and removal to cover; when cured, detach the seed with a stout stick of convenient length, winnow, and put up in barrels or sacks, perfectly dry, and out of the way of rats and mice.

Putting in the Crop.—The ground having been faithfully prepared, the grower must hasten the operation of seeding with the utmost dispatch, as, generally, the earlier the seeding the heavier the lint of the plant. Mark off the land with a small plow, and very shallow furrow, or it may be marked off by a drag made of a small log of wood—anything to make a line to guide the sower accurately; then proceed by hand to broadcast your seed evenly at the rate of fifty pounds of seed per acre as the minimum, or even up to seventy pounds as the maximum quantity, varying with the strength of the land, the object being to produce as thick a growth of plants as the land will sustain. If set too thin on rich soil, the stalks grow too large, producing a coarse and inferior lint; on the contrary, if seeded too thick, the growth proves so short as to materially affect the value of the crop. In Kentucky, the seeding is generally done from the 1st to the 15th of April; in a higher latitude it should be attended to as soon as the ground is dry enough. Cover with a light cross-harrowing. Although the seed is very tender, its vitality easily affected, and its germination often seriously disturbed by unfavorable circumstances, yet if the plants come on well for the first month, and cover the ground, the harvest is pretty sure, as it stands the frost and the drought better than most cultivated crops. From seed time to harvest, the laborer has only to watch its magic growth from day to day.

Harvesting.—The earliest sown hemp is usually ready to harvest about the middle of August. Maturity is indicated by a change of color in the leaf, it generally fading from a deep green to a paler hue bordering on yellow. The male plants ripen ten days earlier than the female, and the time of harvesting should be cast fairly between the two. The old manner of harvesting was pulling, like flax, but this

²See Essay on Hemp, in Ill. State Ag. Report of 1864.

has generally been abandoned in favor of the hemp hook, as the knife is called. McCORMICK's reaper has an effective attachment for cutting hemp, well-adapted to level lands. The operator, in taking up the hemp, uses a rude stick cut from the branches of the nearest tree, about the length and weight of a heavy hickory walking-cane, having at the end of the stick a small branch making a hook. With this primitive but very effective tool he can rapidly draw the stalks into bunches of the proper size for sheaves. In operating he throws his rude hook forward to its full length, and suddenly draws it towards him, each motion making a bunch. This he raises quickly from the ground, and with his hook, by a few well-directed strokes, divests the plant of its leaves. He then binds his sheaf with its own stalks, and passes on to repeat the operation. Other laborers follow, and place the hemp into neat, close shocks of convenient size, securing the top by a neat band made of the hemp stalks themselves, after the manner of shocking corn. It is afterward neatly stacked, to keep the crop secure and dry until the proper time for rotting arrives.

Dew Rotting-Hemp.—In the latitude of Kentucky about the middle of October is the proper time. The crop must be retained in the rick or stack until the Summer heats and rain have passed, and frost appears instead of dew. The whole crop is then removed from the rick, and hauled back to the same ground on which it grew, there to be spread in thin swaths for rotting, where it remains without turning until properly rotted—generally from six to ten weeks. This is indicated by the fiber freely parting from the stalk, and the dissolution by the action of the elements of the peculiar substance that causes it to adhere thereto. This stage is only to be learned to perfection by practical experience.

If taken up too soon, the process of breaking is made very difficult, and the lint is not pliable. If it remains spread too long, the lint is made tender, and its value is injured. If the weather is cold, however, it is not damaged by remaining a week or two longer than is absolutely necessary. After rotting, the plants are again carefully gathered, and put in shocks or stacks, or what is still better, stored under a shed to wait for breaking.

Water-Rotting.—In Russia, and in some sections of our own country, hemp is rotted by steeping four or five days in soft clear water, and such treatment furnishes a quality of fab-

ric of fully double the value of the dew-rotted. Kentucky lacks the necessary streams and ponds of clear water for this process. Iowa, Wisconsin, and Minnesota possess the greatest facilities for it, in their abundant lakes.

EDWARD S. COX, of Sangamon county, Illinois, thus describes his method:^{*} "For the purpose of water-rotting hemp, I have excavations made in the ground into which are built half a dozen framed vats ninety feet long, nine feet wide, and six feet deep, the tops being on a level with the ground. These vats are constructed by thirty six-by-eight inch sills laid crosswise, at each end of which, six-by-eight inch upright posts are morticed and keyed, and stayed at the top by an occasional cross timber. The bottoms ends, and sides, are planked with two inch oak timber and ship-caulked. The bundles of hemp are laid crosswise the vats, which are filled to the top. Four strings of plank or rails are placed lengthwise the vats, across the hemp, over which again, cross timbers are placed and confined at each end under cap pieces projecting from the top of the vat. Thus is the hemp firmly confined under the water. The vats are then filled with water from a cistern arranged for the purpose, and the hemp is completely submerged, the water rising six inches above it. The water for rotting the hemp is drawn from a creek near by, by means of three very powerful suction and force pumps, through cast-iron pipes, into a framed, planked and caulked cistern, fifty-six feet long, fifteen feet wide, and six feet deep, constructed above and at the end of the vats. This cistern, by the aid of the pump, can be kept filled with water, which can settle and become clear, and be let into the vats at pleasure.

"The pumps and machinery for dressing the hemp are propelled by a steam engine, the escape steam of which is admitted into cast-iron pipes laid at the base of the vats, and the heat thus communicated raises the temperature of the water in the vat to ninety degrees Fahrenheit. With this temperature the hemp is rotted in from five to seven days, the glutinous, or cementing matter, which fastens the lint to the stalk, being dissolved by the process of fermentation, and the filaments of the wood becoming concrete and brittle, are easily broken and separated from the lint. At this time all fermentation has ceased and the water is unpleasantly stagnant. The water is now let off through plug holes at the end near the bottom of the

^{*} See Manual on Hemp and Flax Culture, by D. D. T. McCREE, of the Rural New Yorker.

vat, and passes off through a ditch into the creek. The hemp in a few hours is drained ready for throwing out. The confining timbers being first removed, the bundles of hemp are easily thrown out, two men emptying a vat in a half day; each vat holding stalk to make one ton of lint. By this method of water-rotting the business can be carried on every month in the year, in Winter as well as in Summer, as the water can be kept of a uniform temperature by means of steam. The workmen are protected from wet by oil clothes. The business is not unpleasant or unhealthy.

"From the vats the hemp is hauled to the drying grounds, when it is set up in shocks of three or four hundred each—a band being tied around the blossom ends to keep them from falling down. Then the old bands are cut and the stalks well spread, the butts to the ground, inclining outward. As soon as thoroughly dry it is bound in large bundles and secured in store sheds ready for breaking."

Breaking Hemp.—Then comes the last and crowning operation—breaking and dressing the fiber or lint for market. The peculiar break to be used, like the knife or hook for cutting, needs no description, being manufactured in the old hemp regions, at a cost of about five dollars each, and from long experience has been found perfectly adapted to the uses required. The beginner would save time and money by ordering a sample break, from which any carpenter can manufacture as desired. The crop is broken in Kentucky directly from the shock in the open field, by the removal of the break from shock to shock as fast as broken. In higher latitudes, owing to the severity of the climate, it would probably be necessary to remove the rotted hemp to the barn, where the labor of breaking could be more certainly performed. The coldest and clearest weather is the best for this operation; in fact, excess of dampness in the atmosphere suspends this labor altogether.

Mr. Cox, already quoted, thus describes his process of breaking: "Small bunches, having been first separated from the bundles, and the butts uniformly shaken together, are thinly spread upon a revolving endless apron, which passes the hemp between one set of plain and two sets of scalloped rollers, of eight inches in diameter, which gear into each other. By these the wood is crushed, broken, and loosened from the lint. From this machine the hank of hemp, with the butt always kept perfectly square, is passed under a break consisting of three stationary and two interplaying smooth-

edged iron knives, connected by two pitmans, rists and flanges, to a shaft driven by pulleys, by whose rapid motion the shives are effectually detached and stricken out from the lint. Finally the hank of hemp is held and spread over a rest, and receives the action of a square cylinder or scutcher, having four projecting knives or beaters, the rapid revolution of which thoroughly clears it of shives and tow. Thus prepared, the hemp is placed in an extended state, with the root-ends evenly together, into wooden boxes holding twenty-five or thirty pounds. The bundles are then tied firmly, pressed into bales of about five hundred and fifty pounds, well covered with bagging, and secured by cordage, ready for market."

Profitableness as a Crop.—Hemp draws largely upon the nourishing elements of the soil, being almost as exhausting as tobacco. But it sells in our markets at \$10 to \$12 per hundred, and is largely imported from Russia and the Indies, where it sells at 80 cents to \$1 00 a hundred. The *True Kentuckian* says that a gentleman in Scott county purchased thirty acres of land at \$100 per acre. He sowed it in hemp, and the first year's yield was \$140 per acre.

The *Lexington Gazette* adds that Mr. HILTER, of Woodford, realized \$163 per acre for his year's hemp crop. He sold the seed at \$10 per bushel and the hemp at \$10 per hundred. J. H. CRUMBAUGH, of Scott, raised 3,309 pounds of hemp on two measured acres of land. W. VANCE, of Woodford, got somewhat over 1,700 pounds to the acre the first year he introduced the China seed. These perhaps represent an unusual yield, but the demand for hemp in this country is so large and constant, and the product so small, that the crop can not well fail to give a high average profit.

A new textile of the hempen family has been discovered in Humboldt Valley, Nevada, where it grows abundantly as a native. It is said to have a stronger and finer fiber than the hemp proper, and a much longer staple. In proportion to the wood too, the fiber is reputed to be much more abundant and more easily separated than flax or hemp, capable of being stripped clean from the stock without preparation. If it really possesses all these desirable characteristics, it will soon take its place among the valuable textile crops of the country.

Hops.—The hop is a well known climbing perennial, whose blossoms are used for making yeast, and for preserving and imparting a flavor to small beer. They made their way into Eug-

land about 1525, and as the Reformation was then in progress, the following doggerel resulted:

"Hops and heresy, pickered, and beer,
Were brought to England in one year."

This crop is more uncertain than any other production, and consequently the prices are very fluctuating. When there is a scarcity, speculators seize upon it and hold up the price to the highest point at which the crop can be sold, and when there is a full crop, the prices sink lower than they should because the crop can not be kept long without great loss in its value—the peculiar aroma passing off. The foreign demand is also irregular, affecting prices in this country. The following is a table of the annual range of prices since 1850:

Years.	Cents.	Years.	Cents.
1850.....	22 to 60	1860.....	6 to 32
1851.....	17 to 47	1861.....	13 to 23
1852.....	17 to 40	1862.....	.....
1853.....	22 to 46	1863.....	15 to 26
1854.....	5 to 26	1864.....	29 to 52
1855.....	4 to 10	1865.....	10 to 59
1856.....	4 to 12	1866.....	50 to 60
1857.....	4 to 10	1867.....	50 to 60
1858.....	8 to 18	1868.....	6 to 15
1859.....	6 to 25	1869.....	13 to 18

Soil.—The hop plant delights in a rich loam, or calcareous sand, and when these are situated on a calcareous bed, the plants will continue to flourish for many years, but otherwise ten or twelve years is about the limit of their continuance in perfection. Under favorable circumstances, the roots of the hop plant extend, in some instances, to a depth of eight or ten feet. The plant is usually raised from root-cuttings, in the Spring, as the seed tends to produce new and unreliable varieties, like the seeds of fruit.

Site for a Hop-Yard.—In the selection of a site for a hop-yard, it is best to avoid low and wet localities, and to select some spot where the circulation of the air is good, and where no water stands upon the ground at any season of the year. The hop in such localities "fills" much better, and is less liable to blight and mildew, or to suffer from attacks of vermin. As the vines grow very dense, however, and present a good deal of surface to the wind, it is possible to select a location too much exposed. For convenience in harvesting and curing, it is desirable to have the hop-yard as near the farm house as possible.

Planting.—The ground should be prepared thoroughly, in about the same manner as for corn, and well pulverized. The hills should not be less than eight or nine feet apart in all directions, making six hundred and eighty hills to the acre, though only six hun-

dred and forty hills are commonly reckoned, a vacant space on either side left for turning the team being required. As the yard once planted lasts for years, great pains should be taken to make the hills at a uniform distance, so as to be in a perfect line in each direction. A long line should be used in locating the hills, and the spaces between them accurately measured.

Early Spring planting is advisable, as it admits of the plant growing beyond the harm of the cut-worm, and it will better withstand the early droughts, and perhaps yield a handsome profit the first season. Early Fall planting, with some cultivation and light manuring, will yield half a crop the following season. November is an excellent time for planting, but one or two shovelfuls of manure are required to the hill to protect the roots in winter.

The following is perhaps the best method of laying out a hop-yard, methodically: A wire or rope (a wire is preferable as it will not stretch) with a piece of red yarn attached to it every eight feet, and a sharpened stake attached to each end to manage it by, is stretched across the end of the piece. A man at each end carries the wire forward, and stops long enough at each stake to straighten it and give time for one or two boys with baskets of pins (eighteen inches long) to pass along and place a pin at each yarn. Where the hills have been located the earth should be removed from about a foot square, and the place filled with carefully pulverized soil. In this, place three roots, the "eyes" up. The soil should be tramped gently around them, and they should then be covered to the depth of about two inches.

Male and Female Plants.—The sexes of the hop plant are not united in the same plant, but some are male and others female—the *staminate* and the *pistillate*. Since the sexual relations of the strawberry plants has been so thoroughly discussed in the United States, the importance of having some male plants in the hop-grounds will be generally admitted. The male flower grows in a loose panicle, while the female flower is compact, like the cone of the pine tree. The former bears no fruit, but is still necessary to render the other vines fruitful, and is not to be omitted from any well-regulated hop-yard. There should be at least one male plant to fifty female—every seventh hill of every seventh row—in order that the female plant may be vitalized by the winged pollen. A permanent stake should be driven in all the male hills, to distinguish them from the others. In ordering hop-roots for a new yard, which

can be done from any old hop-grower anywhere, and the roots sent in barrels by express, they will be cut up in pieces of the required length, and the male roots put up in a small package, to designate them from the others.

Poling.—Each hill should have two poles, from fourteen to eighteen feet in length, and two to three-and-a-half inches in diameter at the butt. They should be set firmly in the ground, about a foot from the roots, and their tops inclined away from each other. In trimming them, the knots should not be shaved off too closely, or the vines, when they become heavy, will slip down. In some localities, where young timber suitable for poles can not be obtained, sawed poles are used, sawed to a taper and nails driven in a few feet apart, to support the vines when they become heavy. A crowbar will be used in setting them. It is scarcely necessary to pole the yard the first season; but it is better.

Some farmers, in sparsely timbered neighborhoods, instead of using the long poles, use stakes eight feet high, connected with twine or wire across the top, like an arbor. The superiority of this method over the poles is very doubtful.

Cultivation.—The cultivation of hops the first season, is confined almost exclusively to keeping them free from weeds. They will yield a light crop the first season, but scarcely enough to pay for looking after, unless prices should be high. During this year of immaturity, corn or potatoes, or what is better, alternate rows of corn and potatoes and beans, which let in more air and sunshine, can be planted between the hills, and cultivated in the usual manner. Late in the Fall, when the frost has killed the vine, it should be cut off close to the ground, and the hill covered with two or three forks full of "long" manure, or mulched well with straw, to prevent the vines being killed by the intense cold of Winter. This mulching must be followed up each Winter, during the life of the yard.

Next Spring, the vine will put forth vigorously. In a short time it will have grown to be eight or ten inches high; then commences the work of tying up. A large number of vines will be found in each hill; and, selecting the hardest and strongest, two will be started up each pole. For this purpose, they are loosely wound once or twice around the pole, care being taken to wind them in the direction of the course of the sun. They are then loosely tied in their position. For this purpose, pieces of woolen yarn,

raveled from an old stocking, are preferred to anything else. The kinks and quirks in it give it sufficient elasticity to keep the vine in its required position, without confining it so arbitrarily to one place that it is liable to be broken or injured from its inability to yield to any sudden pressure.

On tying up the vines the first time, all the remaining vines in the hill—save one or two, which are reserved to supply the places of those which may become broken by accident—are gathered together, and after receiving a good sharp twist, are bent down and covered up with dirt, when they soon die. These surplus vines should never be cut off, as they bleed profusely, and springing from a common root, weaken the whole hill. The whole yard is gone over as often as once a week to see that the tops of none of the vines become thrown down or lose the pole; and when one is found out of position, it is tied in its proper place in the same manner. When the vines are well up the poles, the remaining surplus vines in each hill, which have been reserved for use in case of accident, are bent down and covered up with dirt.

The poles once set, the yard is plowed once, and at intervals gone over with the cultivator, two or three times, in about the same manner as corn—care being taken not to "hill up" the plants much. The hoe should also be used to work close around the vines. They should be kept clean and free from weeds, as they draw strongly on the soil, requiring for their own proper development all the virtue there is in it; but all cultivation should cease as soon as the vines commence to bloom. If weedy, they can be gone over again after the hop is thoroughly set.

Hop Picking.—We quote from an Essay by W. S. GRUBB, of Sauk county, Wisconsin, to which we are indebted for many of the suggestions of this article: "Hop picking should commence at the very earliest moment that the hops are ready for it, and be pushed forward with all possible dispatch until completed. From the moment they become ripe, the hops commence to shell from the vine, the leaves become weather-beaten, and the strength of the product to evaporate. In this country the hop is ready for picking during the first week in September. By picking a hop carefully to pieces, a few small seeds will be discovered close down to the stem. When these seeds begin to turn black or purple, and become hard, the hop is ready for picking. By keeping a close watch, the hop grower will know some

days in advance when his crop will be ready for harvesting, and secure all the help necessary to keep his kiln running to its full capacity, night and day.

"The pickers are usually women and children who can do this kind of work much cheaper than men, and at the same time earn much more than they could possibly earn under ordinary circumstances. A good smart picker will pick four boxes in a day. They last year received in this county 65 cents per box, without board, and the year before 50 cents. In this county, all the women and girls who can possibly be spared from household duties, go into the hop-yards when the picking season is at hand, and no rich man's daughter believes she is above doing her share in her father's or neighbor's fields. Indeed, the way matters are arranged, the hop picking season is regarded among the young people as a holiday; and, where forty or fifty of them are gathered together, there is generally no want of amusement, and they enliven their work by laughing and talking all the day long, and by dancing and singing a good share of the night. The young people, for nearly a hundred miles around, flock into this county during the picking season; train load after train load coming from Milwaukee and other towns in the eastern portion of the State.

"The number of hop boxes which should be provided depends upon the number of pickers to be employed, for there must be one for each picker. The hop box is generally estimated to contain seven bushels; but the one legalized by statute in this State is three feet long, two feet high, and eighteen inches wide, which will hold a trifle over seven bushels. These boxes are not made singly, however, but a box is made sufficiently large to divide into four compartments of this size. These four boxes in one are called 'gangs.' The 'gang' should be made of some light, half inch lumber, in order that it may be moved around from place to place without too much trouble. There are two handles on each end, to use in moving it. At each end a board projects some two feet above the box, with holes through which a pole can be placed when in use, to support the hop-poles while the pickers are at work.

"When all is in readiness, the 'gangs' of boxes are distributed along one side of the yard, and a stout man to each two gangs is detailed to supply the pickers with poles. Four pickers stand to each 'gang.' With a good knife the hop vines are cut in twain as high from the

ground as a man can reach, and the pole, lifted from its position, is carried to the 'gang.' The butt is placed on the ground, and the upper portion of the pole, around which the hops are clustered, is rested upon the support inserted in the uprights at each end of the 'gang.' Two poles are carried to each 'gang,' and quickly stripped of the silvery clusters. As the cream of the picking lies at the extreme tip of the vines, the butts are carried alternately upon one side of the 'gang' and then upon the other, in order to give all the pickers an equal chance. The vines are not cut until just before the pickers want them, because they soon wilt, which renders the work of removing the hops very difficult. The pickers are careful to pick the hops free from the leaves of the vine, and also from stems, and to break off and throw away all branches which have become broken, and upon which the hops have withered. They drop the hops loosely into the box as they pick them, and are entitled to measure them as they lie. The men who bring the poles to the pickers also remove them when the pickers are through, and, after stripping off the vines, pile the poles in winrows, at convenient distances for stacking.

"When the boxes are filled they are emptied into sacks which hold one or two boxes, to suit the convenience of owners, and thrown upon a wagon, and, when the wagon is loaded, it is drawn to the drying house, and the hop sacks hoisted upon the platform in readiness for spreading upon the kiln. In case of a rain storm occurring during picking, it does not necessarily suspend operations, except while the rain is falling. The boxes can be left out over night, half full of hops, which will not be injured by rain.

"Care should be exercised not to crowd the green hops into the sacks, and not to set them upon or near each other, while waiting to put them upon the kiln, as they will heat and sweat in a few hours."

The Hop-House.—The following description of the required kiln, or drying-house, was furnished by Mr. ROUSE in a volume of the United States Agricultural Report: "The hop-house, or kiln, should be of a size proportionate to the quantity of hops to be cured, so that they may not accumulate on hand. To avoid this, it will generally be necessary to keep the kiln heated both day and night. It is commonly built of an oblong form, and of two stories, the lower part being occupied by the kiln and the press-room, and the upper part by the drying-floor

over the kiln, and by a room of about an equal size for storing the dried hops, which will of course be over the press-room. Kilns are sometimes built of brick or stone, of a circular form, with a round opening in the apex of the roof, surmounted by a moveable cowl, or swinging ventilator, to enable the vapor of the drying hops to escape easily. If the building is of wood, the sides of the kiln should be lined with brick, or thoroughly lathed and plastered. It is found to be most convenient and economical to heat it with stoves, from two to four of which will be necessary, according to the size of the kiln. The drying-floor should be ten feet from the ground, that there may be no danger of scorching the hops in drying. This floor is formed of slats, about one-and-a-half inches in width, and the same distance from each other. These are covered with a strong, coarse cloth, of open texture, so as to admit of a free transmission of the heated air from the kiln below. The drying-room should be of comfortable height, for a person to work in it, and the sides should be lathed and plastered, that there may be no irregularity of the heat in different portions of the room during high winds. A good ventilator should be provided in the roof, as described above. Openings should be left in the walls near the bottom of the kiln, to admit fresh air from without, the draught to be regulated by means of flues, or sliding doors. The cloth for the drying-floor should be well stretched over the slats and firmly nailed. On this floor the hops are spread to the depth of eight or ten inches. The proper thickness will depend somewhat on the condition of the hops."

About nine or eleven hours are required to dry off a kiln of hops at about 130°-140 degrees of heat—the longest time, of course, being required at the commencement of the picking season, when the hops are the greenest. During the drying process, there is great danger of the drying-house, or the hops, taking fire; and no grower should think of attempting it without having an insurance policy on his house and hops, covering the whole drying season.

Baling.—The hops should not be baled under four or five days, and not then unless absolutely necessary; but they should not be allowed to remain unbaled longer than two weeks. They should be put in bales weighing near two hundred pounds, and the bales should be about four and a half feet high, eighteen inches thick and some twenty-seven inches wide. Care should be exercised not to tramp

them too much when put into the press, as they are liable to become broken, and do not sell so readily. A kind of cloth called hop-sacking is made especially for this purpose, and should be ordered in advance to be sure of it. The process of baling it is unnecessary to describe, as the parties from whom presses are procured will furnish all this information. When the bales are finished they should be stood on end—care being taken to leave a few inches between them for the air to circulate.

Grubbing the Roots.—The hop throws out two kinds of roots—the bed-roots, which run deep and nourish the plant; and another set of roots which run to a considerable distance close to the surface of the ground. This last class of roots are really suckers, or runners, and are provided, every few inches, with a pair of eyes (the bed-roots have no eyes) similar to a potato; and, if these roots are not removed, each one of these eyes will sprout and throw up a new vine, and the whole surface of the ground would be covered with such a mass of them that none would be fruitful. Every Spring, therefore, after the first full crop, the entire yard must be gone over, and these roots, or suckers, grubbed up. With a three tined instrument, made in the shape of a hoe, the dirt is first carefully removed from near the hill to prevent any of the bed-roots from being injured. A hook is then placed under the suckers, which are readily distinguishable on account of their eyes, and they are pulled up carefully to prevent leaving a portion in the ground, and thrown into heaps for removal from the yard. It is probable that the previous season's cultivation has raised the crown of the hill, and, while the grubbing is being done, it is cut down to its proper level. The stock of the old vine will be found in the hill, covered with these eyes, and it must be cut off as low down as possible, and yet leave a couple of pair of eyes to throw up new vines. The hill is then carefully covered and leveled off. The roots that are grubbed up are removed from the yard, and, if no market exists for them for the purpose of starting new yards, they are thrown away. If they are wanted for this purpose, however, they are cut into pieces a few inches long, each piece having two pair of eyes. The grubbing should be done as early in the Spring as possible, and resembles hard work about as near as anything in this world; but it must be attended to, or there will be such a wilderness of vines that the ground can not sustain them.

Manuring Hops.—The manuring is done in the Fall, as it thus serves the double purpose of enriching the soil and protecting the plant from the Winter frosts. Hops on clayey loams having been well manured several seasons and requiring none, should be protected in Winter with a fork full of straw to the hill. Young yards require but little if any protection through Winter, while old yards and bearing yards on sandy soil require much. About a bushel of barn manure to the hill, on sandy soil, is none too much, and as the soil approaches the clay, the quantity can be reduced till but two shovelfuls to the hill are required. That the hops may not be smothered, the manuring should not be done until the first or fifteenth of November, or until the approach of Winter. Among the manures recently employed for growing hops in England, are those which supply to a greater or less extent ammonia and phosphoric acid. These form the composition of two important fundamental classes of artificial manures, phosphatic and nitrogenized. Phosphatic manures, it is said, tend to promote the quality of the hops, but not the quantity. Among these manures may be enumerated fresh bones, bone dust, bones treated with sulphuric acid, and Patagonian guano. Animal matter of all descriptions, rape cake, farm-yard manure, nitrogenized matter, such as wool, blood, flesh, Peruvian guano, soot, woolen rags, shoddy, putrid animal substances, horn shavings, glue refuse, etc., are all very conducive to the growth of plants.

Profits of Hop Raising.—The average yield in Great Britain is put at seven hundred and fifty pounds per acre, and that of this country at eight hundred and eighty-eight pounds. The cost of production is estimated by an extensive grower of New York, at ten cents per pound, including picking. The larger portion of all the hops raised in this country for some years, has been furnished by Oneida county, New York, and Sauk and adjoining counties in central Wisconsin. As has been shown in the table, the hop is the most fluctuating in price of all staples; ranging from four cents a pound up to sixty—alternately enriching and impoverishing the thousands who engage in its culture. It is not only subject to the ordinary irregularities of the market, but to the ravages of the hop louse and other insects, sometimes leaving whole miles without an acre which it will pay to harvest.

Before 1860 hop-raising was transplanted to

Sauk county, Wisconsin, by JESSE CODDINGTON—the English cluster variety—after that date it was followed with increasing eagerness until almost all the farmers in the county were involved. The annual growth for several years paid some farmers more than \$1000, or a ton of hops to the acre, and an average of nearly or quite \$500 to the acre; then came the inevitable crash; fortunes were sunk in 1868, and wide-spread bankruptcy prevailed, because Wisconsin, during that year, had produced more hops than were required by the entire nation. A general embarkation in the business resulted from the extravagantly high prices caused by the extraordinary demand; then low prices and a panic followed the excessive supply. The few farmers who have practiced hop-raising moderately for twenty-five years, never investing all their capital in flush times, and never burning their poles in the inevitable day of collapse, have found wealth the result of their careful perseverance.

Indigo.—The invention of the cotton-gin caused the cotton crop in the South to supersede indigo and silk, previous to that time the chief Southern staples. Indigo, however, is still cultivated somewhat largely in the Orangeburg district, South Carolina. The wild indigo, a perennial, is that most used. The season for manufacturing commences in June; the weed is cut several times in the course of the Summer, but only in the early part of the day while the dew is on. The weed is put in a vat, and water poured on it; here it remains until the coloring matter is extracted; the fluid is then drawn off into another vat, and water, strongly impregnated with lime, is mixed with it, the whole being well and frequently stirred, or beaten up. When properly mixed, and an appearance of graining follows it is left to settle. The water being run off, the sediment is taken out and put on a frame to drain, and before it becomes hard it is cut into small pieces and placed on boards to dry; when perfectly dried it is broken into small fragments and put into boxes or barrels, when it is ready for market.

Jute.—Jute is the fiber of a plant resembling hemp, used in the manufacture of gunny-cloth bags, mats, and other coarse fabrics. The American jute is said to grow in abundance in swamp lands in Pennsylvania, New Jersey, New York, and other Eastern States. In their natural state, the plants grow from five to seven feet in height, and are from

one-half to five-eighths of an inch in diameter. The yield in fiber is large. An eastern paper says, an acre of marsh land near Burlington, New Jersey, was plowed, and the seeds of this plant scattered along the furrows on the 28th of April, 1864; in September the ground was thickly studded with plants. Previous experiment made known the fact, that where stalks have been cut off one season, a dozen more spring up the next. No insect has yet been discovered depredating upon it. It is thought, from close observation, that from three to three and a half tons of fiber can be derived from a single acre of ground. Rope and paper manufacturers, it is said, have estimated it to be worth \$100 per ton. The plant is perfectly hardy, and needs no care or cultivation after the first year. Yet America does not raise its own jute. In 1865, we imported 91,549,800 pounds of it, and paid therefor \$12,000,000 in gold.

Madder.—This is a genus of interesting plants—native of Southern and Eastern Asia, but adaptable to any common mellow loam. The pulverized root is extensively used for dyeing red, and, if properly prepared, produces that color in great beauty. It is also used in producing black, olive, blue, yellow, and other colors. Most of the madder of commerce is imported from the Levant, but it is cultivated to some extent in Ohio and Tennessee. It is, perhaps, the most valuable of all dyeing materials. The following directions for raising it are copied from *The Emporium of Arts*:

"This plant may be propagated either by offsets or seeds. If the latter method is preferred, the seed should be of the true Turkish kind. On a light, thin soil, the culture can not be carried on to any great profit. The soil in which the plant delights is a rich, sandy loam, three feet in depth, or more. The ground, being first made smooth, is divided into beds four feet wide, with alternate alleys half as wide again as the beds. The reason of this extraordinary breadth of the alleys will presently appear. In each alley is to be a shallow channel for the convenience of irrigating the whole field, etc. That part of the alley which is not occupied may be sown with legumes. The madder-seed is sown broadcast, in the proportion of from twenty-five to thirty pounds per acre, about the end of April. In a fortnight or three weeks, the young plants begin to appear; and from this time to the month of September, care must be taken to keep the

ground well watered, and free from weeds. If the plants are examined in Autumn, they will be found surrounded with small yellow offsets, at the depth of two inches; and early in September, the earth from the alleys is to be dug out, and laid over the plants of madder, to the height of two or three inches. With this, the first year's operation ceases.

"The second year's work begins in May, with giving the beds a thorough weeding; and care must be taken to supply them with plenty of water during the Summer. In September, the first crop of seed will be ripe; at which time the stems of the plants may be mown down, and the roots covered a few inches with earth, taken as before out of the alleys. The weeding should take place as early as possible in the Spring of the third year; and the crop instead of being left for seed, may be cut three times, during Summer, for green fodder, all kinds of cattle being remarkably fond of it. In October, the roots are taken up, the offsets carefully separated, and immediately used to form a new plantation; and the roots, after being dried, are sold, either without farther preparation, or ground to a coarse powder, and sprinkled with an alkaline ley. The roots lose four-fifths of their weight in drying; and the produce of an acre is about two thousand pounds weight of dry, saleable madder. Madder usually sells for about \$32 per hundred; so that the produce of an acre, would amount to \$640."

Mustard is a well-known, hardy annual, introduced from Europe. Two varieties are somewhat cultivated; the white mustard—chiefly in the garden for salading, and the common black mustard in the field for its seeds, which furnish the table condiment.

The soil they succeed in best is a fine, rich, moldy loam, in which the supply of moisture is regular; it may much rather incline to lightness than tenacity. If grown for salading, it need not be dug deep; but if for seed, to full the depth of the blade of the spade. In early Spring, and late in Autumn, the situation should be sheltered; and, during the height of Summer, shaded from the meridian sun. For salading, the white may be sown throughout the year. From the beginning of October to the same period of April, in a gentle hot-bed appropriated to the purpose. For salading, it is sown in flat-bottomed drills, about half an inch deep, and six inches apart. The seed can not well be sown too thick. The mold which covers the drills should be entirely

divested of stones. Water must be given occasionally in dry weather, as a due supply of moisture is the chief inducement to a quick vegetation. The sowings are to be performed once or twice in a fortnight, according to the demand.

It must be cut for use while young, and before the rough leaves appear, otherwise the pungency of the flavor is disagreeably increased. If the top is cut off, the plants will in general shoot again, though this second produce is always scanty, and not so mild or tender. For the production of seed, whether for the manufacture of mustard or future sowing, the insertion must be made broadcast, thin, and regularly raked in. When the seedlings have attained four leaves, they should be hoed, and again after the lapse of a month, during dry weather, being set eight or nine inches apart. Throughout their growth they must be kept free from weeds; and if dry weather occurs at the time of flowering, water may be applied with great advantage to their roots.

Oats.—The oat is a very valuable cereal grass, of which several varieties are cultivated for their seeds. Of these, the common oat is far the most important. Its spikelets contain two or three seeds. The oat is a native of cold climates, and a wild sort grows indigenous around the whole belt of the temperate zone. It degenerates as it is carried southward, and at last refuses to yield profitable crops as it approaches the equator. It flourishes remarkably well in Scotland and Ireland, and, during the last century, oat-meal has furnished the principal bread of the inhabitants.

More oats than wheat—in bulk—are raised in the United States by over a million bushels, but the annual increase of their product is much less than that of wheat and corn. There should be something like 200,000,000 bushels raised in 1870. The States, named in the order of this yield, are New York, Pennsylvania, Ohio, Illinois, and Wisconsin—these produce considerably more than half of the whole.

The oat has fewer enemies than most of the cereals, and may be raised with less labor than any of them—in fact, so easily is it raised, that very great negligence prevails in almost all parts of the country where it is grown, in properly preparing and enriching the land. It has strong assimilative powers, and makes such a rapid growth, that two crops are frequently gathered in a year, especially where one is cut for fodder when in the dough. This double-

cropping is, however, denounced by the most experienced farmers as bad husbandry.

Fifty bushels to the acre is a good average yield, but a hundred have been realized on some soils. Horses prefer oats to any other food, and nothing else is so nutritious, excepting beans; corn contains double the quantity of oil, and is less acceptable. The ration of French cavalry horses in service, is eight to nine pounds of oats daily, and an equal quantity of good hay. A pound of first-quality oats gives a horse as much nourishment as two pounds of clover hay. In France and Germany, the practice of baking oats into loaves for horse-food is gaining ground, and is said to be attended with economy.

Preparation of Soil.—Oats thrive the best on a rather moist soil, of a somewhat closer, heavier texture than is required for the best crops of corn. They should properly follow roots or some hoed crop. The ground should be plowed as soon after the frost is out as it will admit of working well; plow deep, and with a narrow furrow slice; no matter if subsoil is brought up; the oat will bear it. The frosts of Winter have the effect to loosen the soil and leave it in a favorable condition, so that teams, fresh and strong, will better perform their part in deepening the soil than at any other season of the year. The judicious farmer should ever keep in mind that it is better to add to his farm by deepening the soil than in adding to the acreage.

Selecting Seed.—Wm. H. WHITE, of Connecticut, to whom we are indebted for the most of this article, writes to the *Cultivator*: "A great failing, too common among farmers and cultivators generally, is the want of care in selecting and saving seed for future use. In selecting oats, the heaviest, brightest, and plumpest only should be used. Take the best to be had, and assort them in one of the following ways: By throwing them across a long floor, retaining only those which go the farthest—the lightest will fall short; by running them through a fanning mill, turned rapidly to blow over the lightest—the heaviest and best will run down, and those only should be used. To procure seed at first, this is the best way; but when a crop is grown, the better way is to take from the best part of the field that wanted for seed. Take the bundles and whip them across the head of a barrel, select therefrom such as will readily shell out, and divide still farther as before. In this way the standard weight may be kept up indefinitely, and an improvement oftentimes made on the original."

Sowing.—The seed should be put in the ground as soon after plowing as practicable. This is done by hand-sowing broadcast, and then harrowing or plowing in, and by sowing with the drill. Oats generally are sown broadcast, and harrowed in; some farmers sow plentifully, and turn under with a light plow; but drilling in seed is coming more and more into favor. By drilling, the quantity per acre can be more exactly regulated; the covering is more uniform than by any other method; and the seed is more evenly distributed. Being covered uniformly, it comes up simultaneously. Moreover, says Mr. WHITE, "drilled oats are less likely to lodge than hand-sown, even when sown on similar soil side by side. It will usually pay to let the land lie long enough to dry sufficiently, and roll it to break down any clods, and fit for a good seed-bed; then drill in the seed—the depth to be governed by the soil—from one to two inches, and finish off with the roller. In sowing broadcast, the seed is put on immediately after plowing, and harrowed twice over—lengthways and crossways of the field, followed by the roll to finish off—an important item to help keep down the weeds and facilitate in harvesting the crop. Ground liable to have standing water should be underdrained, or at least water furrows should be opened after sowing, to conduct the water off; for no kind of grain is expected to thrive where water is allowed to stand upon it, if we except rice. Different cultivators use from two to four bushels of seed per acre. As a general rule, the better and heavier the soil, the more seed it will bear; a safe average amount would be three bushels. The earliest sown produces the best crop, both as to yield and weight; the latest the next, and between the poorest.

Harvesting—"Oats, unlike wheat and rye, are better and heavier for not being cut too green, although the straw is less valuable for fodder; being cut green, they pack closer, do not cure as well, and are liable to injure in the mow or stack, unless well ventilated. The best way of cutting is with the grain cradle, which leaves them spread thin in the swath, and gives an opportunity to dry, so as to be gathered, bound, and put in the stack or mow, without danger of injury, as is too apt to be the case when cut with the reaping machine, and thrown off in "gavels." In the former case, if wet, they soon dry out, often without turning; but in the latter they require to be spread. The straw of the oat will retain wet with much greater

tenacity than that of any other grain. The grain is bound in suitable sized bundles, and set on the butts to sun and dry a few hours, and then either carted to the barn or shocked in the field, where they may remain in perfect safety for some weeks. Lay three or four sheaves in the center, so that the heads will not come in contact with the ground, which is easily done by weaving them together; build around these in a circle, keeping the heads of the bundles higher than the butts, and in the center; keep the sides perpendicular to the desired height; then draw in evenly, and finish off with a cap sheaf, set and bound on firmly.

Thrashing.—"The old modes of thrashing with the flail, and tramping out with horses, have given way to the improved machine driven by horse or other power. An important part is cleaning the grain, as a nice, clean article will always command a ready sale, and at a better price, than an equally good article mixed with dirt, chaff, etc. The grain runs through the fan-mill twice—first with a coarse-meshed riddle, and again with a finer—will usually expedite the cleaning and do it more satisfactorily."

Rotation, etc.—"The great value of oats, and the ease with which they are raised on almost every kind of soil and under the most slovenly treatment, have given them a place in almost every scheme for a rotation of crops. Of all the plants commonly cultivated in the field, oats seem to have the greatest power of drawing nourishment from the soil, and hence are justly considered as greatly exhausting the land. But, with proper management, they may be made as remunerative as any other common crop, for the oat helps itself to food, and requires less from the hand of man.

There is no better grain with which to sow grass seed for stocking down than oats, and for that purpose they are much grown. They are benefited by most of the usual fertilizers, except such as contain much nitrogenous matter or lime, these retarding the ripening, or producing a rank growth of straw, causing it to lodge. The best way is to enrich the soil through previous crops, getting it in good heart and tilth, not applying any stimulant directly to the growth of the plant. A cool, moist season, usually gives us the heaviest and most prolific crops.

Varieties.—Several kinds of oat are cultivated in different nations and localities. The common oat has three varieties: the black, the

gray and the white. Those of the first class are commonly hardy, have small seeds, become early ripe, and are hence well adapted for cold, hungry soils, such as those which are usually found on considerable elevations. The gray, or dun-colored oats, on some soils, yield very remunerative crops. The third and most valuable of this class of oats is the white. "The most improved of these," says Professor Low, "are without awns. They are the least hardy kinds, but they are of the greatest weight to the bushel, and the most productive of meal. In this class the potato oat is that which has possessed the greatest reputation for a time in the districts where it is cultivated."

The Norway Oat.—American farmers, especially at the East, have been considerably excited for two or three years, by the reports of the extraordinary yield of Norway oats. The excitement has not abated, and thousands of farmers in all parts of the country have, the past year, investigated the extravagant claims of this cereal.

The following is a statement of its origin: In the Spring of 1864, D. W. RAMSDALL, an enterprising Vermont farmer, found a single oat in a package of peas received from the United States Agricultural Department, and as it seemed unusually plump and vigorous, he planted it in his garden. "Its germination of numerous stalks, their surprising growth and size, their ability to ripen as soon as the common oats, and above all their truly wonderful yield of two thousand seven hundred and eighty-five grains, being from four to six times that of the old kind and being far superior in quality and weight, induced him to carefully preserve them for further experiment." The next year's crop, from a part of the seed, was three bushels.

The fame of the oats now began to spread, and when, in 1867, Mr. RAMSDALL reaped the harvest of fourteen acres, an unprecedented crop of a superior grain, the oat-fever had culminated; the rush for seed soon exhausted the supply, and, in some cases, fifty dollars were offered for a single bushel. One bushel sown to the acre is sufficient. The *Boston Traveler* says: The celebrated Norway oats will produce two or three times as much as common grain. Specimens of the growth are truly wonderful, and it will not lodge. It yields splendid quality, and 45 pounds to the bushel," one-half more than the yield of the common oat. The stalk grows five to six feet high, and measures one-fourth of an inch in diameter, while the heads are ten to twenty inches long—some have been found even twenty-six inches.

The *Vermont Argus*, reports the yield of 6,750 grains from a single kernel. We admit the following witness: Rev. M. P. BELL, Norman's Kill, Albany county, New York: "The growth of straw was about five feet, heads very long and full, yield from one pint, three bushels. They ripen as early as my common oats. I can recommend them to the farming world with confidence." Another: "I sowed 13 quarts upon one-half acre of corn-ground, sown broadcast, and no manure. The result was highly satisfactory, giving me 42 bushels of measured oats. Reducing this to our standard weight would give me 51 bushels from thirteen quarts. The whole field averaged five feet in height, and gave me heads sixteen inches long." Another says: "Mine had a great growth. I counted the smallest hill, and my son counted the largest one, and then we made an estimate from these, and found the yield to be 253,487 grains from 31 oats, an average of 8,177 grains to each oat sown. The stalks stood over six feet high. Surely they are the greatest oat I ever saw or heard of. A great many people have visited my field to see them, and are enthusiastic in their praise."

GEORGE W. THORN, of Rahway, New Jersey, says: "The result of my experiments this season (1868) with the Norway oats have been fully up to my expectations, and I am satisfied that they are well adapted to our soil, and that every farmer who possibly can, should get the seed. The substitution of the Norway oats for the common and deteriorated kinds now generally raised, is a matter of vast importance to our farming interests; to increase the annual yield, even a small per cent., would be regarded as a great success, but to double the crops at once, as I believe we may do by using this seed, is an advantage which should be immediately understood by the farming community. To raise a field of oats, the stalks of which stand six feet high, with well-filled heads, over twelve inches long, and yielding 100 bushels to the acre, is an accomplishment of which any farmer would feel proud, and I believe we can do this with the Norway oats."

After making all due allowance for the partiality, fraud, and extravagance of speculators, there remains a mass of concurrent testimony which would seem to be sufficient to establish the Norway oat at the very head of the oat family, and to authorize its general substitution for the common varieties on our soil. The black oat of Chester county, Pennsylvania, is

probably akin to the Norway, and is declared by those who grow it to be not inferior. The Surprise oat is also highly commended.

Onions.—The onion is a very ancient plant; the Egyptians worshiped it as one of their gods, two thousand years before the Christian era, and the Israelites deeply lamented its loss—(Numbers, xi, 5). In Spain and France it forms one of the common and universal supports of life. In addition to its peculiar flavor, which first recommends it, the onion is remarkably nutritious. According to JOHNSON'S analysis, it contains from twenty-five to thirty per cent. of gluten, thus ranking with the nutritious bean and the best grains. If it were not for the peculiar power with which it "fetches its breath," it would take its place by the side of the potato, as an indispensable tuber.

It contains much nutritive mucilage, and is very useful for its soothing and healing properties. When analyzed, it is found to contain water, sulphur, phosphoric, and acetic acids, some vegeto-animal matter, and a little manna. It is not merely as a relish that the wayfaring Spaniard eats his onion with his crust of bread, as he sits by the refreshing spring; it is because experience has proved that it helps to sustain his strength also, and adds, beyond what its bulk would suggest, to the nourishment which his simple meal supplies. When its acrimony has been extracted by vinegar, it possesses a very agreeable, sweet, and delicate flavor. The onion grows in many different forms—sometimes multiplying by numerous bulbs beneath one blade, like the potato, and again forming bulbs, with the same essential appearance and properties, at the top of the blade.

This vegetable is one of the most valuable of the anti-scorbutics, and, during the civil war, 1861–5, was in great demand in both Northern and Southern camps, as an enemy of the scurvy. It strengthens the body, brightens the sight, resists fatigue, and increases the digestive power.

Soil.—The onion thrives best in a rich, damp, black, mellow, sandy loam; a fertile alluvion is best of all. Level land is preferred; if this is not practicable, a gentle southern slope, under the full influence of the sun.

Preparation—The onion is a gross feeder; the soil can not well be made too rich. Fifteen to twenty-five loads of well-rotted compost, or hog-pen manure per acre, is not too much, and a dressing of ashes—a hundred bushels to the

acre in the Spring—is a valuable auxiliary. Clear the ground intended for onions of all stones; plow deeply in the Fall, and in the Spring re-plow if the land needs it and follow with a thorough harrowing. Unlike most crops, onions will do well on the same ground for a series of years.

Sowing.—Be sure and get good seed; it should be the growth of the previous season, and should sink when placed in water. If you wish to give your field an early start, put the seed into blood-warm water before the first of April, and set it where it will not freeze, and let it remain for twelve or fifteen days. Be careful to have the water always cover the seed. In two or three days, if the seed be good, it will be manifest by the strong onion smell which it will emit. At length drain the water off, and stir among the seed some plaster, keeping it, however, a little moist and warm. At the end of three days the seed will have thrown out sprouts half an inch long. Then plant it about half an inch deep, and in six days you can see the rows. A hand-drill will generally be found most convenient for sowing; it makes two drills twelve inches apart, and drops the seed in them an inch or two apart at the same time. These are covered by rolling, or by pushing a bright hoe obliquely over the rows. Sow four to six pounds to the acre.

Cultivation.—Keep the weeds out is the whole secret of the cultivation of onions. By all means start a hoe or some weed-cutter as soon as the onions are large enough to show the rows. Some recommend sowing radishes with the onions so as to follow the rows more readily. "The tools needed for hoeing and weeding onions are few and simple. The most approved hoe in use, is usually made from a buck-saw plate, either new or worn, cut about eight inches in length, and from one to two inches in width, with a goose-neck riveted on the inside of it; or to make the hoe stiffer, two goose-necks are used, riveted as before, but about one and a half inches from the ends of the plate, and uniting in one shank in the handle, which may be about five feet long. This hoe should be kept clean and bright, so that the dirt will slide over it without being much displaced. A push or scuffle hoe is sometimes used in the advanced growth of the crop. The tools used for weeding, aside from what nature has provided, are a crooked knife (common case or shoe-knife with the lower end bent up), and a weeder, made of thin steel

plate, about two inches long and one wide, riveted with a goose-neck, like the hoes, and fixed in a handle about eight inches long. Later in the season, a larger weeder is used, about four inches in length, and set in a handle about two feet long. This is used, when the onion-tops have become large, for the purpose of taking out single weeds, and when hoeing the ground would injure the onions.³⁰

Eight or ten days after the first hoeing, the first hand-weeding should be performed. It is impossible, however, to lay down rules here, unless it is the single one, never to let the weeds get the advantage. Small weeds are more easily killed than large ones and with less injury to the crop. The labor of weeding may be performed by children after a little practice. This crop should usually be hoed about once in two weeks in the earlier part of the season; the weeds *must* be kept down, and the more the ground is stirred the better for the harvest. Above all, don't neglect them in the haying season; the temptation is strong, but the onion is a jealous jade, quick to resent inattention—and inattention at this season is often ruin.

Pulling and Storing.—When the crop is mature, which may be known by the withering of the foliage, the shrinking of the necks, and the loosening the roots, the onions should be pulled by hand and be thrown in windrows, about three rows being thrown into one. At this time all weeds remaining should be pulled and piled before shedding their seeds, preparatory to the final clearing of the bed. The pulling of the crops should not be delayed after the tops are well dry, for if rain should now fall the onions will be apt to re-root to their injury. "Should the backwardness of the season make it necessary to pull the crop in rather a green state, it will be well to allow it to remain untouched after pulling for about a week, before turning or stirring, which will tend to hasten the decay of the greener tops; otherwise, they should be carefully stirred every pleasant day with a wooden-toothed rake. See that they are not injured by the raking or treading of a careless hand.

"When the crop is thoroughly dried, the onions feeling hard to the handling, it will be ready for topping for market. They are carefully collected in baskets, rejecting all stones, scullions, and rotten onions, and taken in wagon loads to the barn, and there the tops are cut off clean to the onion with a sharp knife. This is

usually done by boys or women, at two or three cents by the bushel. While collecting, look sharply on the bottom of the onions to detect rotten ones. Some growers prefer to leave such of the crop as they design to keep for a late market untopped. If it is intended to market the crop immediately, the onions may be piled to a depth of three or four feet, otherwise they should not be over two feet in depth. Leave the barn doors and windows all open every pleasant day. As the crop is topped, those of the size of a hazel-nut are classed as pickle onions, these being marketed principally for that purpose, and usually bringing nearly as high a price as the full grown ones."

Tracing or Roping Onions.—The onions are sometimes traced. This is done by cutting off the neck within about two inches of the bulb, and binding it to a handful of straw. Beginning at the butt-end of the straw, lay the neck against the straw, give two or three firm turns with the twine, add another onion, and thus proceed until the straw is covered, the larger onions being tied to the bottom and gradually decreasing in size to the top. Onions so slowly ripened that they would soon spoil if stored in a mass, will keep well when traced, and oftentimes bring a greater profit than the best of the crop. Rareripes and such of the earlier onions as are to be sent long distances, or be kept awhile before marketing, are usually traced. Traced onions keep in good condition a long while in a cool dry place. The crop is usually put up into ropes of three and a half pounds, and a fair crop is from six thousand to eight thousand such ropes.

Fall Sowing.—In England, and in the latitude of Connecticut, in this country, it is sometimes profitable to sow in the Fall. Farmers who wish the crop for early marketing, sow in September, cover the bed, about the time of the first frost, with sea-weed or barn-yard manure, to prevent Winter thawing, uncover when the frost is out, and the onions will have a month or two the start. This practice is, however, subject to some danger of injury to the seed.

Profit as Crop.—There are a few rural towns in Connecticut where no area of good friable land can be purchased for \$500 an acre, because it is adapted to the onion crop, and farmers have acquired wealth in the culture. A good harvest is five hundred bushels to the acre; though seven or eight hundred bushels are often gathered. Onions are, perhaps, the most profitable crop that can be raised by a farmer who has good market facilities.

• Wm. J. JENNINGS, of Connecticut, in *Agriculturist*.

One large cultivator says: "I think one thousand bushels or more can be grown by proper cultivation. Red onions are now (1864) wholesaling at three dollars per barrel, and white ones at four dollars per barrel. One year I sold my onions at one dollar per bushel, and sent them to market in the Fall before housing. I have sold red onions as high as five dollars a barrel, and white ones at six dollars. There has been no time within twelve years, but that onions would bring two dollars a barrel in the course of the year."

The onion crop of Scott county, Iowa, in 1865, reached a million bushels, and averaged four hundred bushels to the acre. One man gathered three thousand four hundred bushels from six acres, while some acres produced more than eight hundred bushels.

A correspondent of the *Agriculturist* makes the following estimate of the cost of an acre of onions:

Twenty loads of manure at \$1 50.....	\$30 00
Carting, turning, spreading, etc.....	6 00
A hundred bushels ashes, at 17 cts.....	17 00
Plowing and harrowing.....	4 00
Raking and sowing.....	4 00
Four lbs. of seed, at \$1.....	4 00
Hoeing four times, 6 days.....	6 00
Weeding, four times, 24 days.....	20 00
Pulling and piling, 12 days.....	10 00
Drawing in with team, 2 days.....	6 00
Topping 500 bushels, at 2 cts.....	10 00
Marketing.....	8 00
Interest on land.....	12 00
Total.....	\$137 00

A crop of onions will vary from two hundred to eight hundred bushels to the acre, according to the state of the soil, manure, the care taken of them, etc. The price also varies from ten cents to one dollar per bushel.

A correspondent of the *Providence Press*, makes the following statement of the profits of a single acre of land cultivated the last season by D. S. REED, of Bristol, Rhode Island: "Noticing in Monday's *Press* your statement about Captain A. B. CHADSEY's crop of onions and carrots from two and a quarter acres, I desire to give you a statement of D. S. REED, of Bristol. His lot contained one acre, five-eighths of which was planted with onions and three-eighths devoted to raising onion-seed and some other crops of small account. He sold in one lot from the five-eighths of an acre \$1,248 worth of onions, and has 150 bushels still on hand, which at \$1 50 per bushels, would make his crop of onions bring \$1,450. From the other three-eighths of the acre he sold to BURGESS & BARRETT \$600 worth of onion-seed, and reserved \$100 for his own use. Now add \$75 for a good crop of carrots, put in after taking off the onions, and we have the nice little

sum of \$2,248 as the yield of one acre. The net income from the acre was \$2,000." This, of course, an extraordinary result, but the raising of onions, as a general crop, pays well; the conditions are a fertile soil, clean and thorough cultivation, and an early start in the Spring.

Varieties—The round and solid onion known as the Wethersfield Red, is the sort mostly grown in Connecticut. It has a large yield, ripens early, is of beautiful color and flavor, and cooks and keeps well. The silver-skin is the handsomest onion, and brings a good price in market. If grown for a Fall or Winter market, the Wethersfield Red is unsurpassed. If for the earliest market, the potato onion will be found excellent, cultivated on a small scale.

Parsnips.—Parsnips are seldom raised as a field crop. The ordinary varieties are the common Dutch and the Jersey or Guernsey. It is propagated from seed sown annually, in in deep, rich, loamy clay, or sandy soils, and is cultivated like the carrot, already described.

Peas.—Canada farmers use peas instead of corn to fatten their hogs, and they make very firm and sweet pork. A good many intelligent farmers of New York, are imitating the Canadian practice, and they claim to find in it a double advantage—a saving of thirty to fifty per cent. in doing so, besides a quick and easy method of maintaining a maximum condition of fertility in their land, without expending half their income for expensive mercantile fertilizers.

A writer in the *Rural New Yorker* says he planted last year two and a half acres in peas; seed nine bushels. Land fair but very weedy. Sold green peas to the amount of thirteen dollars. Fed to two hogs and five pigs seventy-eight dollars' worth, and has on hand forty bushels, worth eighty dollars, making the whole crop worth one hundred and seventy-one dollars; deducting the seed, eighteen dollars, leaves value of crop, one hundred and fifty-three dollars. He began to feed in July and fed in August, September, October, and November, whereas his corn would not have been ripe enough to feed till October and November. It is easier to fatten pork in warm weather. He thinks a bushel of peas in September worth two of corn in November. The peas can be grown on soil too poor or too foul to give a good return in corn, are more easily raised and harvested, more solid, sweet pork, and the straw greatly improves the quality of the manure—mixed

with other grain it is the best food for horses he ever used. He soaks the peas twenty-four hours in water, when the hogs eat them greedily and fatten rapidly.

The cow-pea is used with much advantage, as a green fertilizer, on soils too poor to bear clover or oats. Peas grown for stock, will generally need the support of brush, or a twine trellis.

The most successful way to avoid the bug is to grow a second crop of peas in a season from the seed obtained from the first crop, and there will be no buggy peas, no matter where or how kept—for, as the weevil in question is single-brooded, a second crop of peas will be entirely exempt from its attacks.

Potato.—This is an esculent root, of two well-known varieties—the sweet potato and the common white potato—and both are indigenous to Central and South America. The wild potato is a coarse, bitter, not very agreeable tuber; the potato of commerce is entirely the result of culture.

History.—The introduction of the potato into Europe is somewhat obscure, on account of confounding the two widely different varieties. The sweet potato was probably carried to Europe from New Grenada by Sir JOHN HAWKINS about 1550, or by the Spaniards somewhat earlier; the white potato was carried from Virginia (now North Carolina), by the colonists of Sir WALTER RALEIGH about 1585: HARRIOT, the keen-eyed scholar and historian of the expedition, gathered quantities of the potato, maize, and tobacco; and BANCROFT says "the tuberous roots of the potato, when boiled, were found to be very good food." Specimens were sent back to the queen, and the experimental cultivation of the potato was begun. One of the first crops seems to have been grown upon Sir WALTER'S estates at Youghall, in Ireland—whence its name, Irish potato.

The new tuber crept slowly into Europe, meeting everywhere with great opposition. As tea had been lampooned and prohibited by law twenty years earlier, and as coffee was denounced as a poisonous invasion, so the abhorrence of the potato plant was general in England, and universal in France. The scientific men set forth its deadly qualities, and even the most moderate of its opponents asked protestingly why this coarse and detestable root from the land of the Incas should be forced upon the public, while the soil of France was capable of supplying the most salutary and delicious pro-

ductions of the vegetable kingdom. The king wore the potato blossom in his button-hole in vain. But the patronage of DRAKE and RALEIGH, PARMENTIER, and poor LOUIS XVI, pressed the introduction gently, and at last in the famine of the revolution potatoes for seed were accepted by the people from the garden of the Tuilleries.

When potatoes were introduced into Russia, toward the end of the last century, the people conceived a great dislike to them and from their superstitions was evolved the history that the devil complained, on being driven from the Garden of Eden, that he had no fruit, and the potato was created expressly for him. For generations, the potato was known as "Devil's fruit." But it is now a chief article of cultivation and use across the central belt of Europe, and its introduction has enabled the soil to feed double the population that it was formerly considered possible to support. In Ireland, potatoes constitute from three-fifths to four-fifths of the food of the people.

It is claimed that New Hampshire first cultivated potatoes in America; that they were introduced in 1719 by the Londonderry colonists from Ireland. But they were cultivated a hundred and twenty years before this time in Virginia; and in 1640 they were sent to the "vynegrowers" of the colony of the Massachusetts.

Of the two kinds referred to, we shall first treat of the white or Irish potato.

Amount of Crop.—According to the census of 1860, the amount of this crop was 110,571,201 bushels; the crop of 1865 was estimated at 5,000,000 more. About four-fifths were raised in the Northern States, and New York produced almost one-fourth of the whole. Among the edible vegetable productions of our country, potatoes rank fourth, following wheat, corn, and oats.

Nutritive Value.—Professor JOHNSTON finds, from twenty-seven analyses, that the greatest proportion of water in young potatoes was 82 per cent.; in full-grown potatoes, 68.6 per cent.; the average of all being seventy-six per cent., leaving of dry matter 24 per cent. A large part of the solid matter in potatoes consists of starch; the average being, according to SIEMENS, about 15.98 per cent. The nitrogenous (flesh producing) matter is from 5 to 10 per cent.; and the fatty matter is 1 per cent. The dry potato is about equal in nutritive value to rice, and somewhat less than the finer varieties of wheat flour. The acidity is due to the presence of malic acid.

Soil.—Like corn, wheat, and grass, potatoes find their best adaptation in a fertile sandy loam of medium tenacity, pasture land, or any new turf lands, producing them in abundance. They should never be put in a clay soil until it has been reduced to a condition of friability, and received an abundance of proper manures.

Preparation of the Soil.—"As early in Spring as the ground is settled and dry enough to work, plow with the lap furrow to the depth of ten inches, laying the furrow slices smooth and true—make them of equal width. The potato being of a somewhat coarse growth, we are apt to plant it in ground but illy-prepared, which may be one cause of its degeneration." Deep plowing is of the utmost importance to the success of raising potatoes. Where the soil may not have been rendered deep, by thorough previous cultivation, and fears may be entertained on account of turning up the under soil, the subsoil plough should be used, to break up and render the earth beneath the surface soil subservient to the action of the air, make the descent of the roots of the vines easy, and pass off the water, as it may percolate through the earth, in order that it may not remain to stagnate and impede the healthful growth of the plants.

Planting.—Planting should be done as early as practicable. In some parts of the South they are planted in December; in some parts of the North, in some seasons, in February and March. Lay off the land into rows, three-and-a-half feet apart, with a light plow, and drop the potato sets into the drill at the uniform distance of a foot. If a rot be feared, it is best not to apply fresh manure directly to the potato, but to fertilize the ground through previous crops, or at least apply it the previous Fall.

Special Manures.—An analysis of the ashes of the potato gives the following result:

	Roots.	Tops.
Potash.....	40.28	81.9
Soda.....	23.34	99.0
Lime.....	3.31	129.7
Magnesia.....	3.24	17.0
Alumina.....	0.50	00.1
Oxide of iron.....	0.32	00.2
Silica.....	0.84	49.4
Sulphuric acid.....	5.40	04.2
Phosphoric acid.....	4.01	19.7
Chlorine.....	1.60	05.0
Total.....	82.83	302.4

From this, it will be seen that a manure composed of the right proportions of potash, soda, lime, and vegetable matter, and a little phosphoric acid, will form a most powerful fertilizer. Wood ashes, unleached, will supply

the potash, salt will supply the soda, lime is easily obtained, and bones will give the phosphoric acid. With these, and muck or loam, mixed together, and left for a few weeks, or during the Winter, to be fully pulverized, the farmer has the finest compost for his potato-field under the sun. The ingredients are cheap and accessible.

Preparation of the Sets.—A great diversity of opinion exists on the subject of planting whole large or small potatoes, cutting in large pieces, and cutting to single eyes. It is generally admitted that planting potatoes whole, produces a greater number of stalks, with the chance of yielding more potatoes. One advantage of employing whole potatoes, is, that they are not so susceptible to the influence of a drought; and it will sometimes happen that a soil is so dry as to require whole seed. Dr. F. M. HEXAMER, at a meeting of the American Institute Farmers' Club, gave the result of seventeen different ways of planting the potato. He obtained the best results from putting one large whole potato in a hill; the next best yield was from two large half potatoes cut lengthwise; the next from the seed end of a large potato; the next from a large half potato cut lengthwise; and nearly the same result when the larger potato had its seed end cut off. The lowest yield was from half of a small potato; one piece, with an eye, did a little better.

W. HUDSON, in the *Country Gentleman*, gives his experiment with the Early Goodrich, as follows: Of course all the rows had similar treatment.

No. of Row.	No. of Potatoes planted.	Preparation of Seed.	Tractor Cut.	Weight of Potatoes Planted.....	Weight of Potatoes dug.....	Yields per Acre.....	Yields per Acre.....
				lbs. oz.	lbs. oz.	bu. lb.	bu. lb.
1.	20	Large.....	Uncut.	8 14	56 0	38 19	212 0
2.	20	Medium.....	Uncut.	3 8	47 12	15 7	206 19
3.	20	Medium.....	Uncut.	3 7	58 0	14 48	350 26
4.	11	Large Small.....	Uncut.	2 6	51 0	10 11	220 22
5.	20	Small.....	Uncut.	2 2	6 45 12	8 36	198 33
6.	20	Small.....	Uncut.	1 14	47 8	5 5	187 55
7.	40	Very Small.....	Uncut.	1 12	45 10	5 3	198 25
8.	20	Very Small.....	Uncut.	1 4	37 12	5 32	163 7

"There was very little difference in the potatoes of the different rows; potatoes of good size. Row No. 1 contained very many the most small potatoes, rows No. 3 and 4 the most uniform in size, but my men thought 6 and 7 as good as any."

W. W. DANIELLS, Professor of Agriculture in the Wisconsin State University, reports the following interesting result of a similar exper-

iment carefully made by himself. Planted, May 23, in rows three and a half feet apart each way, three inches deep, with similar after culture, seed differently prepared, as follows :

No. of Lot.	METHOD OF PREPARING SEED.	Bushels planted per acre.....	Bushels harvested per acre.....	Size of Potatoes gathered..
1.	Large potatoes, whole, one to a hill.....	20	Large.	123
2.	Large potatoes, quartered, three pieces to a hill.....	15	do.	110
3.	Small potatoes, whole, one to a hill.....	8	do.	113
4.	Small potatoes, cut in fourths, three pieces to a hill.....	8	Medium.	113
5.	Medium size; seed-end to a hill	...	Large.	107
6.	Medium size; one to a hill, without seed-end.....	5½	Large.	132
7.	Same as No. 2.....	15	Medium.	120
8.	Single eyes, three to a hill.....	...	Small.	84

All farmers should avoid the error of drawing general conclusions from a single series of experiments, however apparently uniform. Such conclusions can be safely trusted only when the experiments are sufficiently numerous to indicate a reliable average.

A farmer in Northern Illinois says he has never failed to raise good potatoes, and an abundance of them. "My plan is this: I plant the seed-ends of good-size potatoes on good ground, but never manure them. If the ground is not naturally rich, it should by all means be made so; but this manuring should be attended to from one to two years before planting potatoes. That the seed-ends are as good as whole potatoes, I have satisfied myself by repeated experiments. I plant two seeds in a hill, the rows five feet apart by two and a half, furrowing my ground one way with a light plow, then drop my seed across the furrows, which saves marking my ground one way, and plow them in."

A Long Island farmer last Spring planted four rows of equal length, of two varieties of potatoes. In one row, with each variety, he planted only the "seed-ends" of the potato; in the other, the opposite or "butt-ends." These were the pink eyes and peach blows. "The yield was as follows: pink eyes, butt-ends, 217 pounds; pink eyes, seed-ends, 170 pounds; peach blows, butt-ends, 225 pounds; peach blows, seed-ends, 179 pounds. The potatoes raised from the butt-ends were much larger than those from the seed-ends, and appeared to be from a week to ten days earlier. Had the whole field been planted with butt-ends the yield would have been more than 500 bushels to the acre."

In 1866, W. H. FARQUHAR, and three neigh-

bors, in Maryland, separately experimented to ascertain the best method of preparing seed-potatoes. The manner of the experiment was this: Nine rows, each four rods in length and three feet distant from each other, were planted with the several preparations of seed mentioned in the table, the sets being placed fifteen inches apart. The soil was similar, the same manures used in each row, and all were planted at the same time. The following table gives the result :

Increase over and above the seed, per acre.....		Bush.
		236 1/2
		182 1/2
		146
		151
		133
		94
		132
		99
		79
AVERAGE OF EXPERIMENTS.	Pounds dug.....	74 1/2
	Pounds planted.	16 1/2
No. 4.	Pounds dug.....	64 1/2
	Pounds planted.	18 1/2
No. 3.	Pounds dug.....	66 1/2
	Pounds planted.	10 1/2
No. 2.	Pounds dug.....	61 1/2
	Pounds planted.	25 1/2
No. 1.	Pounds dug.....	53 1/2
	Pounds planted.	11 1/2
Whole:		Large potatoes.....
		Medium potatoes.....
		Small potatoes.....
Cut to two eyes:		Large potatoes.....
		Medium potatoes.....
		Small potatoes.....
Cut to one eye:		Large potatoes.....
		Medium potatoes.....
		Small potatoes.....

"I do not presume to say," writes Mr. FARQUHAR, "that the conclusions to be drawn from the foregoing table have any claim to be considered decisive. The number of experiments was too limited. Only one sort of potato, the Buckeye, was used. The yield in each case was quite moderate, and the trial was only for one season.

"The results, so far as they go, however, are certainly very striking; they are suggestive, though not decisive, and appear to me well-deserving of consideration and careful repetition. The experiments were made in the only way in which reliable conclusions can be obtained—that is, by accurate weighing and measuring, and the results coincide in a manner quite remarkable."

If the indications of this table are correct

how tremendous is the loss, every year, from the use of small potatoes for seed! The table furnishes striking evidence of the importance of making a number of systematic experiments, in order that this particular question may be settled—for its definite settlement would result in great benefit.

Having been often told that anything would do for seed-potatoes, a correspondent of the *Rural New Yorker* planted four rows of twenty hills each, in the center of his field, with the following result:

	Marketable.	Small.
1 large potato in a hill yielded.....	.67	24
4 small " " " "	.53	37
4 cut " " " "	.61	37
8 eyes only " " " "	7½	13½

Another correspondent thus treats this subject: "Why should whole potatoes be planted? Every eye on a potato (if sound) gives rise to a vine and forms a root. If, therefore, there are a number of eyes planted together, as must be the case where a whole potato is deposited in the ground, can the vines flourish as they would if grown separately and a considerable distance apart? They certainly could not; and the inevitable consequences of thick bunches growing from so many eyes, will be potatoes of uneven size, many very small, and unripe when taken up, even late in the Autumn. I had found this to be the case with many crops when the seed had been cut into large pieces of uniform size, without regard to the number of eyes. Consequently, when the very question of whole seed planting or cut planting was being agitated, I determined to try the plan which seemed to be most in accordance with common sense—remembering that if too many branches are suffered to remain on an apple tree, or too many apples to remain on the branches, the fruit would be very imperfect, and of very small size. Accordingly, I carefully cut the seed so as to leave but one eye in a piece, and dropped the pieces about eighteen inches apart. The result was a fine crop of large potatoes, of uniform size—there not being small ones enough from an acre of ground for dinner. The potatoes from which these one-eye pieces were cut were selected from the largest of the previous year's crop. The combination of two causes—seed not thoroughly ripe, and plants too thick—will manifestly deteriorate any crop. My motto for potato growing now is: *The largest and most perfect seed, cut into one-eye pieces, and planted wide apart.*"

Towards the decision of this question, we have at hand the details of an experiment of JOHN ROBERTSON, an intelligent cultivator of

Ireland, reported by DOYLE. This gives a superiority of produce to whole potatoes, sixteen inches apart, but at a greater expense of seed than with sets of two eyes.

The following is the definite record of an English experiment—equal culture being given:

No. of rows.	DIFFERENT SORTS OF SETS PLANTED 17TH MAY.	No. of plants ed.	No. that grew.	Appear- ance of top.	No. fit for table.	Total No.	Gross weight.
1	Large whole potatoes.....	8	All	Very fine	56	91	115.
2	Large whole potatoes, prepared by cutting out a half inch deep and an inch in diameter.....	8	All	do.	53	87	16
3	Small whole potatoes.....	8	All	{small {spiral}	13	39	4
4	Sets with a single eye cut in the usual way.....	8	All	do.	22	5	4%
5	A crown eye cut circular and con- taining about $\frac{3}{4}$ inch diameter.....	8	All	fair size	27	37	5½
6	A side eye cut as last.....	8	7	do.	18	26	3½
7	Kind with two eyes $\frac{3}{4}$ inch thick.....	8	7	small	12	22	2½
8	Sets with the eye cut in half.....	8	All	do.	20	6	5½
9	Large potatoes with the rind not peeled off, but all the eyes scooped out about half an inch deep.....	8	4	fair size	19	24	4
10	Large potatoes peeled about $\frac{1}{4}$ inch thick all over.....	8	4	small	9	20	2
11	Budded potatoes.....	6	All	do.	none		

A farmer in Michigan recently wrote thus to *The Prairie Farmer*: "Having fitted a piece of sward, and planted about one-third of an acre in the usual way, with cut seed, three pieces to the hill, I selected good-sized potatoes, cut off the seed-end, about one-fourth of the potato, and planted a row of the butt-ends, and another of the seed-ends; planted one row with whole ones of the same size, one to a hill; then one row of small ones, of the size of a hickory nut, three to a hill, with stakes to mark all the rows. Having dug the portion planted in the usual way with a yield of one bushel to twenty-two hills, I dug the row of butt-ends, yielding one bushel to fifteen hills, all large cooking potatoes, and no small ones; then the row of whole potatoes, seventeen hills for a bushel, some small ones; next the row planted with seed-ends from large potatoes, twenty-eight hills to a bushel, some large ones; and last, the row

planted with small seed, thirty-four hills yielding a bushel, all small ones. The rows were three feet apart, and the hills two and a half feet apart."

These experiments would seem satisfactory in their uniform verdict against small potatoes for seed. THOMPSON says, in the *English Gardener's Assistant*: "Large tubers are preferable for seed, for the following reasons: In all plants, large buds tend to produce large shoots, and small or weak buds, the reverse. Now, the eyes of potatoes are true buds, and in small tubers they are comparatively weak; they consequently produce weak shoots, and the crop from such is inferior to that obtained from plants originating from larger tubers, furnished with stronger eyes."

But the results above recorded appear inconclusive as deciding the question between whole potatoes and cuts, and between many and few eyes; though the tendency of the testimony favors cuts, from fair, good-sized potatoes. "The practice of cutting to three or four eyes, or to a single eye, must depend on circumstances. For ordinary management, or where the finest culture and best care can not be given, pieces with three or four eyes may be planted, twelve to twenty inches apart in the row. This is the mode now most generally adopted by the better class of cultivators. But if the soil is in the finest condition, a larger crop, with more uniformly large potatoes, may be obtained by adopting the single-eye mode. For this purpose the tubers should be of fair size, and be cut some days before planting, so as to form a thin dry crust on the cut surface before depositing in the ground. Some cultivators regard it as important to roll the pieces in slaked lime or plaster, while others entirely disregard it. We are unable to say what amount of value the practice possesses. The distance should not exceed eight or ten inches in the row, but may vary with the character of the variety, for spreading at the top and at the roots—some varieties forming more compact masses of tubers than others."

Selection and care of Seed-Potatoes.—The best time, suggests the *Agriculturist*, to select seed-potatoes, is when they are dug. As soon as they are brought to the surface and lie spread on the ground, the best can be selected with less difficulty than at any other time. Those that are perfectly matured, and of good shape, having the marked characteristics of the variety, and good average size, should be selected for seed, in preference to those of any other

qualities. They should then be placed in boxes or barrels, and kept where they will not be injured by freezing or by warmth. If seed-potatoes are saved in this manner for a few years in succession, we have no doubt a decided improvement will be observed in the yield per acre, as well as in the quality of the crops. And we think this practice will also be found an effectual security against small ones, and a good defence against the rot. When potatoes first come from the ground, the skins have a clearness, which they soon lose.

Testing Potatoes for Seed.—The heaviest potatoes contain the most starch and are, on that account, most nutritious and valuable. As new varieties of seedlings are very desirable to keep up the vigor of the plant and avoid disease, and are, of late frequently offered to the public, it is well to know of a convenient and accurate method of testing their respective qualities. The potato will sink in pure water. To test the relative qualities of different kinds, put a piece in a definite quantity of water and add salt by weight until the potato will float. The potato which requires the greatest quantity of salt to float it in the water is the best.

Cultivating.—As soon as the tops make their appearance generally above ground, go through with the horse cultivator, and repeat two or three times during the season, according to the condition of the field. Going through after a rain and pulling all the weeds carefully, will obviate the necessity of hand-hoeing, which is so expensive with large cultivators. The last dressing should be sometime previous to blossoming, and the ridges be but slightly raised. In cultivating, the soil will work into the furrows and somewhat deepen the covering. The young tubers will form and grow without disturbance. If the earth is now hilled much, new and late tubers will form higher or above the first, producing too many, and irregular in size. The best way is to leave the soil nearly flat until the middle or latter part of Summer, when the potatoes begin to assume considerable size, and to protrude toward the surface. Now is the time for hilling, which is, in effect, nothing more than *mulching* the roots to protect them from light, and to prevent them from becoming green. A small quantity of soil being sufficient for a mulch; the old Indian plan of drawing the earth up into great mounds is passing away.

Harvesting.—The crop should be harvested as soon as ripe, not left in the ground through the Fall rains, for this practice is often produc-

tive of rot. Potatoes are ripe when the tops have died down, and can be pulled without bringing many, if any, tubers with them. If the skin does not peel readily when rubbed with the thumb, the potato is ripe. The digging on a small scale is best done with a potato hook; on a larger by a plow; and dry weather should, if possible, be selected for the operation. Potatoes should not be permitted to lie in the sun and wind, but should be gathered at once, on the same day, and carried under cover, with as much soil as will adhere to them. They may then be carefully spread, if they are wet or muddy, and dried, previous to being binned.

Storing.—Farmers, even the best farmers, have different favorite methods of preserving potatoes. All agree, however, upon certain indispensable conditions: 1, Potatoes should be kept dry; 2, they should be kept from the light; 3, they should be kept as cool as possible, without the danger of freezing; 4, they should be well ventilated; 5, they should be handled as carefully as fruit, for bruises invite disease.

By disregarding these simple requirements, more than one-fourth of the entire potato crop of the country is sacrificed every year—an immense and a needless loss.

If potatoes are stored in cellar-bins, the cellar should be kept at a uniform temperature of 40° to 45°—and the fact that most cellars are much warmer than this in Autumn, and sometimes considerably colder in Winter, tends to make general cellar storage unadvisable. Bins should never be more than two or three feet deep, and should be elevated a few inches from the ground, to admit of complete ventilation. A correspondent of the *Scientific American* earnestly recommends the following method, having been enabled by it to keep potatoes for years with complete success, though in some instances the tubers were diseased when taken out of the ground: "Dust over the floor of the bin with lime and put in about six or seven inches deep of potatoes, then dust with lime as before. Put in six or seven inches of potatoes, and lime again; repeat the operation until all are stored away. One bushel of lime will do for forty bushels of potatoes, though more will not hurt them, the lime rather improving the flavor than otherwise."

The tendency of potatoes to sprout in the early Spring is reported to be prevented in Scotland, and by so doing, their full edible qualities are preserved, and "mealy" potatoes

can be had all Summer from the previous year's growth. The experiment costs but little, and is worthy of being tested by every one who doubts its efficacy. "Obtain from a druggist one ounce of liquor of ammonia (hartshorn) to a pint of water; let the potatoes be immersed in a mixture of this proportion four or five days; dry them. Their substance is thus consolidated, and much of their moisture extracted without the slightest injury for all table qualities, but their vegetative power is forever destroyed. If spread out after immersion so as to be well dried, they will keep good for ten months."

Storage by burying out of doors has been much practiced of late, and tends to supersede the old plan of cellaring for potatoes that are to be kept over until Spring. It is a little more work, and the roots are less accessible, but it secures to them more uniform darkness and dryness, and an even temperature, and so, better average preservation.

For "holing out" select a high dry spot, thoroughly drained, and on its summit scoop out a circular earthen saucer, say four to eight feet in diameter, and eight to ten inches below the surface, and lay around the outside a ring or wreath of clean, bright straw, to keep the potatoes in place. Then pile up a potatoe pyramid, leaving the surface smooth and uniform. Some farmers shovel over the heap first six or eight inches of fine dry loam—according to the climate—with a stratum of straw over that, but experiment indicates that the layers should be reversed, bringing the course of straw next the heap.



SECTION OF POTATO HEAP.

The *Annual Register* says: "We have found that by placing sixty or seventy bushels in a heap, covering with a foot of packed straw and three inches of earth, has been uniformly successful, not one per cent. generally being lost by keeping through Winter." Ventilation is effected by fixing a chimney of straw through the earth at the top of the pile—projecting horizontally so as to prevent the introduction of water. From twenty up to a hundred bushels can be preserved in this way. They

should be taken out of the pit in early Spring and marketed or put into barrels, headed up and placed in a cool cellar, or ice room, where the temperature is low enough to keep them from sprouting.

All other root crops may be kept in capital condition in the same manner, and the soundest, brightest cabbages we ever saw were cut from the stumps in November, piled up and covered in that way, and came out the first week in May, not an unedible head among them.

Plucking the Blossoms.—M. ZELLER, director of the Agricultural Society of Darmstadt, reported that in 1839, he planted two plots of ground with potatoes. When the plants had flowered the blossoms were removed from those in one field, while those in the other field were left untouched. The former produced four hundred and seventy-six pounds, the latter only thirty-seven pounds. Mr. GRAHAM, in England, tried a similar experiment, and reports that the difference of yield in favor of the rows from which he plucked the blossoms, was forty-three per cent. This testimony must be received with hesitation, and the experiment should be tried on a small scale.

Raising Potatoes under Straw.—COLMAN'S *Rural World* has the following: "On a recent trip in St. Clair county, Illinois, we saw hundreds of acres of land covered with straw. The ground had been plowed and harrowed, and marked off, and potatoes dropped, and then the whole surface covered about six inches deep with straw. *The potatoes have no further attention till digging time, when two or three hundred bushels per acre are obtained.* The straw keeps the weeds down, and the soil cool and moist. The straw is raked away in Autumn, and there lie the potatoes, white and clean. The straw potatoes bring the highest price in the market."

This method of planting has been tried largely, sometimes resulting in great success, and sometimes in failure—depending apparently on peculiarities of climate and soil. J. CASS, Sacramento county, California, writes: "For the last three years my potatoes have invariably run to vines and set no potatoes. Last year I tried the covering with straw, and I had splendid potatoes; the ground kept moist all Summer, and we could get a mess any time by rooting in the straw with our hands. I planted as follows: Old ground that was in assorted vegetables the year previous, was plowed in, and half potatoes, cut lengthwise, dropped fifteen inches apart, in every third furrow, and put about eight inches of old wheat

straw on them; it seemed to check the growth of vines and made the potatoes set." Tan-bark, and forest leaves, have each been used with similar success.

Yield.—In former years, the average crop was rated at four hundred bushels an acre; at a later period, at two hundred bushels; at a recent period, at one hundred and fifty bushels; and, since the ravages of the rot, the average has been still further considerably reduced. General BURNUM, of Vermont, many years ago, raised a thousand bushels of potatoes to the acre, but his plan involved laborious culture, and a frequent supply of rich, light compost, during the period of growth. The national statistician in his report for 1867, estimates the average yield of the potato crop at eighty-two bushels per acre. Florida gave the highest average, one hundred and forty-three bushels; then Texas, one hundred and thirty; Vermont, one hundred and sixteen; Michigan, ninety-five; Some farmers still raise five hundred on an acre almost every year.

Degeneracy of the Potato.—The frequency with which the potato fails to produce the expected harvest, seems to indicate that it ought not to be depended upon as the chief edible crop of any nation. Experience has proved that there is a great tendency to deterioration in the potato when planted for a long time. Some of the older kinds, that were so productive and good when introduced, have degenerated to a very low scale. By continued planting they lose their robustness of growth and great yielding powers, and become feeble, and liable to be attacked by disease.

Corn, beans, turnips, etc., can be improved by careful culture, while the potato is best near the time of its origin. Remedies have been sought to prevent the potato disease. New ground, ashes, etc., have been tried; but the best specific is doubtless the adoption of new, vigorous varieties. At the present time this remedy is most easy, owing to the great number of seedlings produced by enterprising cultivators. Indeed, every man may try new varieties, producing them from the seed of the ball.

Renewal seems to be demanded by the potato. New blood serves it better than old. It is the most democratic of tubers. No aristocracies can long exist in its domain. The "first families" dwindle and die out from year to year, and their place is taken by some red-faced parvenue that has no reliable ancestry whatever, but is sweet in flavor and sound in heart. It

is a fact now generally admitted, that persistence in the culture of any one potato for a term of years, tends to rapid deterioration. The tubers obtained from the true seed will be small the first season; the second growth will suggest the quality.

VARIETIES.—The sorts of potatoes that have been cultivated are quite innumerable; even of those which have in their time and home, proved to be of good quality. We shall enumerate a few that have been more or less extensively grown:

The *Mercer*, known also as the *Nishannock*, (from the stream near which it originated), the *Shannock*, *Chenango*, and *Philadelphia*, was first grown fifty years ago in Mercer county, Pennsylvania, by JOHN GILKEY. It was for twenty years much more largely cultivated than any other potato, and was esteemed for its early ripening, excellent quality, and reliable yield. But it rots badly, and its culture has been generally discontinued, except on light, dry soils.

The *Carter*, originated by JOHN CARTER, in Berkshire county, Massachusetts, forty years ago, is unexcelled by any of the old varieties. It boils to mealiness, and has a delicate flavor, but it ripens late, is very liable to rot, and is now running out.

The old *Pinkeye* family have done good service in their time. They were of fair quality, but they straggled much in the hill, and were of poor average yield.

The *Early June*, a fine, large, smooth tuber, especially prized for its early growth; but this, too, is crowded to the wall by varieties of a more productive yield.

The *Prince Albert* is an English seedling, oblong, flat, white, smooth, and handsome, and generally prolific. It is of good average quality; but has yielded to the rot and promises to be superseded.

The *Dykeman* originated in Oneida county, New York; it is large, round, and white, yields well, and the fact that it is earlier than the *Mercer* has made it quite a favorite in the vicinity of large Eastern cities. In some soils it still does well, in others it degenerates rapidly.

The *Buckeye* has been grown sometimes with remarkable success, especially in Ohio. It is a fine, large, white, round potato; matures early, and comes to the table mealy and delicious. It is a little capricious, but often returns a heavy yield, and is said to be less affected by the rot than most other kinds. For early use an excellent variety.

The *Peachblow* was originated by CALEB

SHEPARD, of Saratoga, New York, in 1850, and it has done excellent service in the course of the rotation of potatoes. It is still much cultivated, especially at the West, and is a general favorite for the table. It is of a color that suggests the name, but its flesh is white and delicious. The yield is good. Its habit is to ripen late, and this makes it less liable to rot. The *White Peachblow* was produced from the pit of the *Peachblow*, and now holds its place as one of the best known varieties. It is hardy, produces remarkably well, keeps admirably, and takes the lead in the New York market in the Spring. *Peachblows* require to be planted early, and they will then be the very last to ripen. The vines grow rank, and they will not bear crowding. The tubers run a great deal in the hill, which makes the digging slower and more laborious than any other variety. The *Shepard Reds* were introduced by the same gentleman; they are a good potato, much prized in some localities.

The *Jenny Lind*; strong and vigorous; large and irregular; in color red and white; coarse in flesh, and not very good for the table. It keeps well, and seems freer from disease than most potatoes that are of better quality.

There are also the *Dover*, small, red, and of good quality; the *Davis*, large, productive, and hardy, farinaceous, and excellent for the table, but little known out of New England; *Jackson White* or *Orono* (nearly or quite identical), white, large, round, fair, tender, and a heavy yielder—an offspring of the *Carter*; the *St. Helena* and *California*, both immense yielders, one coarse and soggy, and the other coarse, strong, and watery, equally unfit for the table, and of doubtful value for stock; the *Rohan*, famous in history and infamous for the table; the *Keeper Blue*, a Western variety, large, round, and excellent for the table—its meat white and tender, its coat a dark blue; the *Black Mercers*, *Scotch Grays*, *English Whites*, and other well-known varieties, cultivated, most of them, all through the last generation.

The right to the field is being contested by newer varieties. Many of these seem more vigorous than the old sorts now are; less susceptible to disease, and more productive. If this shall prove to be as it seems, we shall have a clue to the whole mischief; the degeneracy may be checked, and the potato may be restored to the health and productiveness of its ancient days.

South American.—These potatoes are sometimes called the *Early Peachblow*, and were transplanted some years ago from South Amer-

ica, to Columbus, Ohio, whence they have spread. G. S. INNIS says: "They are stronger growers, have larger tops, and yield more abundantly than the Peachblow. We have yet to see the first rotten one or unsound one—that is to say, one with the potato disease or hollow-hearted."

Among the recent varieties which attract general attention are a half dozen seedlings propagated by the late Rev. CHAUNCEY E. GOODRICH, Chaplain of the Lunatic Asylum at Utica, New York, who spent sixteen years experimenting, and who finally selected and disseminated these as the best out of some thousand new varieties.

The *Early Goodrich* is the best known of these. It is very early and large, with a white skin, smooth eyes, white flesh, of fair but not the very best quality, sound and solid to the core, keeps well and yields abundantly—on good, rich soil, 300 bushels to the acre. The testimony is almost unanimous affirming the very heavy yield of the *Early Goodrich* during the last three years. A farmer planted, May 6, on a turned sward—three small cuts in a hill—and thus gives the result: "I dug a few hills August 14, when they were fully ripe. The crop was harvested September 4th, and proved the finest and largest I ever grew. I weighed many hills that produced 11 pounds each, or five and a half hills to the bushel. Nearly half gave 9 pounds each, or less than seven hills to the bushel—many of the tubers weighing over a pound. In quality they are nearly if not quite equal to the Carter, 'the *ne plus ultra* of potatoes.' In ordinary field culture they matured earlier and produced less—about 350 bushels to the acre. They are of medium size, with few small ones." Another gathered more than seven bushels from seven pounds planted; another more than a bushel from a single potato.

The *Goodrich* seems to be one of the very earliest of potatoes, boiling dry two weeks before the *White Sprout*, and yielding more. L. M. BROWN, of Woodbury, Iowa, writes that he raised the *Early Goodrich* at the rate of over five hundred bushels to the acre, and that they were "in quality superior to any early potato with which we are acquainted." The extraordinary yield of this potato was maintained through 1869, though accompanied, some thought, with a tendency to degenerate in quality.

The *Harison* is another famous potato of the

Goodrich seedlings, maturing rather late. It is long, large, and smooth, with full eyes, white skin and flesh, sound and healthy, an admirable keeper, of the best quality for the table, and very productive. The average yield on good, rich soil, well cultivated, is three or four hundred bushels to the acre. Its pre-eminence is mainly attributable to the fact that it is a first class table potato. C. R. CHIPMAN, of Dane county, Wisconsin, writes: "I procured four pounds of the *Harison* potatoes, planted them on one and one half rods of ground, putting one eye in a hill; hoed them twice, and dug eight bushels of good sound potatoes, which is at the rate of eight hundred and fifty-three and one-third bushels per acre."

The *Gleason* is much esteemed among the new varieties. It is a handsome red potato; rough skin; small proportion of undersized tubers; luxuriant vines; grows till frost, maturing late; generally very free from rot, and good for the table. Is quite prolific, yielding three hundred to six hundred bushels to the acre, with proper culture.

The *Cuzco* is another of these seedlings. A farmer says of it: "This will be classed as a late variety—is the most productive kind grown so far. The produce, with the little attention received, exceeds four hundred and fifty bushels per acre. White, irregular, and unpromising in appearance, with some show of the disease; but the yield is so heavy it can not fail to be in demand for a market variety where quantity is the object to be obtained." The *Cultivator* says: "The *Cuzco* has yielded on the grounds of the writer at the rate of five hundred and twenty bushels per acre—and there was but one objection to this sort, namely, that the potatoes were not good for anything."

The *Garnet Chili* has been widely introduced, and is a good hardy sort of excellent quality. It perhaps averages better for the table than any other of the *Goodrich* seedlings, and this may be the result of the fact that it produces rather less. It has a rough red skin, and is hardy and little liable to disease.

The *Calico* is a seedling of the *Garnet Chili*, which it fully equals in productiveness and hardiness. In shape it resembles the *Prince Albert*; being white, smooth, and handsome, with splashes of pink. Very good for the table.

A correspondent says: "I have raised the last two years, a potato called the *Early Main*, said to be a seedling from Mr. *Goodrich's* stock, which I think very highly of. It is a

* In an Essay on the Potato in Ohio Agricultural Rep. for 1866.

kidney potato, with scarcely perceptible eyes—a good yielder when properly cultivated, quite as early as the Early Goodrich, and for table use unexcelled by any potato now cultivated; white, mealy, and of the flavor of roasted chestnuts. For baking, I prefer it to any potato I know of, early or late."

The *Coppermine* is represented as being "early enough for an early market variety, a first-class table potato, light red, very smooth and regular, not very productive as classed with other of the Goodrich seedlings, but has yielded two hundred and fifty bushels from one acre."

The *Early Rose* potato was presented two or three years ago as a candidate for the public preference, and it has succeeded in attracting much attention and winning many advocates. It is a seedling of the *Garnet Chili*, and was originated in 1861 by ALBERT BRAZEE, an intelligent Vermont farmer. It is claimed to be the earliest variety known, and the most productive.

Its general character is stated thus by the *New York Sun*: "Very early and large; skin smooth, of a pale rose-color, almost white when fully matured; the eyes prominent, not deeply sunken as in many of the older varieties; form long, oval, slightly compressed; flesh snow-white, and very dry and mealy, without any strong flavor as found in some of the large late varieties; it is also very productive, and the tubers keep well and retain their good qualities until Spring." During 1867 and 1868, these potatoes were in demand at ten to fifty dollars a bushel, and were widely disseminated. The testimony in their favor was voluminous.

N. RICHART writes from Columbia county, Pennsylvania, "I bought last Spring one pound of "Early Rose" which I planted May 6th and dug August 6th. After drying them four days I weighed them, and had *one hundred and one pounds* of the finest potatoes I ever raised, several of them weighing over one pound each." G. and S. BOALT, nurserymen of Norwalk, Ohio, testify to the following astonishing yield: "We bought one pound of "Early Rose" potatoes last Spring and have just dug the crop from one-half of them, and we have (by measure) *four and three-fourths bushels*. We do not think the other half will do quite as well, but we are confident we shall get three bushels from it, making *seven and one-third bushels* or *four hundred and forty pounds* from one of seed." It is said that marketable potatoes of this variety can be grown in sixty days. Our readers will, of course, make some allowance for reports of extraordinary results, and proceed carefully in

experiments based thereon. There is one great agricultural truth that farmers should understand, viz.: that different conditions in growing potatoes, in many instances, produce very different results. The influence of soil and climate and seasons, whether wet or dry, cold or hot, is great, and varieties that may yield abundantly and be of superior quality in one locality, often prove unproductive and almost worthless in another.

Unless the statements concerning the Early Rose are greatly exaggerated, and there is a wide-spread conspiracy to misrepresent in the interest of the propagators, which seems impossible, the potato is worthy of general acceptance wherever soil and climate are adapted to its growth.

J. LATHROP, jr., of Centerville, Lake Superior, writes: "On the 29th of last May I planted one-half peck each of the Early Goodrich, Harison, Gleason, and Calico potatoes. My land was new and just cleared, stumps all green. I cut them the same as I cut all my potatoes, only a little smaller, planted three pieces in a hill; each lot was planted on about five rods of ground (a trifle less). The Early Goodrich were ripe and tops all dead in August. I dug them September 20th, before which time they had been killed by an early frost. The Calicoes were in full bloom, and some blossoms still on the Harison when the frost struck them:

SEED PLANTED.	Rate of growth.	Yield in bushels.	Rate of seed per acre.	Rate of yield per acre.
$\frac{1}{2}$ peck Early Goodrich.....	5	14	4 bu.	112
$\frac{1}{2}$ peck Harison.....	5	14	4 "	112
$\frac{1}{2}$ peck Gleason.....	5	12	4 "	100
$\frac{1}{2}$ peck Calico.....	5	9 $\frac{1}{2}$	4 "	76

J. V. VAN WYCK reports the result of an experiment to ascertain the best variety of potato, and the best method of planting. The following table shows the yield of each variety by each method, per acre:

	No. 1	No. 2	No. 3	No. 4	No. 5	Average of different methods.
Gleason.....	115	116	116	116	116	122
Common Peach-blow.....	51	80	43	26	36	49
White Peach-blow.....	58	51	43	42	41	48
Garnet.....	51	54	58	21	21	44
Jackson Whites.....	145	116	101	89	80	104
Dykemans.....	58	21	43	31	21	39
Junes.....	51	72	62	40	40	59
Av. of different kinds	84	74	67	45	45	

"Those planted deepest, came up last, but looked better throughout the season than the others. They were all plowed five times and hoed once, the labor of cultivating being the same on each patch. The labor of digging Number 1, was somewhat the greatest, as the potatoes were nearly a foot beneath the surface. The season was very wet, so that the yield was small. Had it been dry, I think there would have been a much larger difference in favor of those deeply planted. None rotted except a few of the Jackson Whites.

"The average of the whole was but sixty-six bushels per acre—a very small yield; still, my object, to a certain extent, has been gained, and the lesson is as valuable as if learned from a yield of two hundred bushels per acre."

Dr. F. M. HEXAMER, of New York, recently read a paper before the Fruit Grower's Club, from which the following is an extract:

"Had I to make a selection of six varieties to plant for early marketing, I would choose, for early:

"Early Rose, because it is the earliest and best early variety.

"Early Goodrich, which, although it has not succeeded well in the last wet season, is, when grown under favorable conditions, of excellent quality, of good size, shape, and color, productive and free from disease. For medium or main crops:

"Harrison, because it is the most productive and most profitable table potato in existence, of white skin and flesh, large size, fair quality, and entirely free from disease.

"Lapstone Kidney, for its beautiful shape and appearance. It succeeds in soils where the Prince Albert has failed. It is an excellent baking potato, and by many preferred to any other. For late:

"White Peachblow, because it is, when matured, the most sought for potato in market, unequalled by any other variety for its mealiness. The growing of the White Peachblow has made many a farmer rich, and favorable seasons will no doubt improve it again, as they have improved other varieties.

"Gleason.—For its hardiness. It is a surer crop than any other potato. Be the season wet or dry, be the land manured with fresh manure or old, or none at all used, the Gleason is certain to grow, if it is planted early enough and well cultivated. Its quality is not first rate when dug, but it improves by keeping and is

quite acceptable if kept till April, when some other varieties are no longer fit for table."

The Potato Fever.—Beware of the potato fever. It is during some years and in some districts, more malignant than the potato rot. It affects the dealers more than the tubers, and generally breaks out in the eye—of the former. Printer's ink aggravates the infection. It soon makes its way to the pocket.

The symptoms are indicated in the following extract from a newspaper: "Sixteen potatoes brought \$825, twelve potatoes brought \$615, one brought \$50, and one was traded for a good cow, valued at \$60." Another paper tells of a man in Vermont who "bought one eye of a potato, and raised from it, this season, potatoes that he has sold for \$750, and has three left. Eight were bought by one man for \$400."

We trust there is nothing in these pages calculated to spread this contagion. It is quite similar, in its general characteristics, to the tulip disease, which prevailed in Holland in the early part of the seventeenth century, spreading over the whole kingdom, affecting the inhabitants far more than the precious bulbs. While this disease was at its height, one person was known to invest his whole fortune, 100,000 florins (about \$50,000) in the purchase of forty roots. A writer of that period gave the following inventory of articles that could be bought for one tulip root: "Two casks of wheat, four casks of rye, four fat oxen, eight fat swine, twelve fat sheep, two hogsheads of wine, four tons of beer, two tons of butter, one thousand pounds of cheese, a complete bed, a suit of clothes, and a silver drinking-cup—the whole valued at 2,500 florins."

This fever comes in the shape of a mild financial insanity; the infected never know they have caught it. It breaks out in a virulent form about once in thirty years; seizing, at each re-appearance, some new plant. The *Morus Multicaulis* was its last idol; then fools rushed from town to town offering thousands of dollars for worthless bundles of twigs. Beware of the fatal virus; once absorbed, there is no known remedy but "bleeding."

The Potato Rot.—The disease, in the form of rot, which sweeps off most of the potato crop every few years, would seem, as already intimated, to be an admonition to warn us that no nation ought to rely upon the potato for the

principal food of its people. No certain remedy is yet developed; indeed, it is not positively known what causes the rot. One variety of rot, says the *Scientific American*, has been found by ALEXANDER HENDERSON, of Buffalo, New York, to originate in the depredations of a bug. "If a tuber be examined with a microscope just before planting, on it may be seen a small, yellowish, translucent, oval object, secured, as is common with insects' eggs, by a gummy substance, to the potato. This will produce unsound potatoes, and the egg is that of the *Phytocoris*. When the tuber is planted at the ordinary depth, this egg hatches, but if the potato is planted deep, the egg is killed, and therefore, *deep planting* is one remedy, because air and light are prevented from coming to the delicate egg. After a sufficient amount of warmth and moisture has been obtained by the egg, the shortest time that has yet been observed being six days, the shell opens along its greater axis, and out comes the small insect, without wings, from about the twentieth to a twelfth of an inch long. It has six perfect legs, two antennæ, a proboscis, and a pair of brilliant black eyes. The proboscis is about two-thirds of its body in length, and one-third of its length from the head is thick, seen coiled upon itself, and the remainder is flexible and needle-like. It contains three tubes, through one of which it sucks up the juice of the plant for its nutriment; through another it probably ejects a poison into the plant, and through the other it may perform part of its respiration." Mr. HENDERSON'S remedies for this rot, which he declares to be the most prevalent kind, are: 1, Killing the egg by sprinkling quicklime on the seed-potatoes; and, 2, preventing its development by deep planting.

The effects of all rot will generally be reduced by observing the following simple rules: 1, *Select dry ground, or drain thoroughly*; 2, plow deep; 3, do not apply barn-yard or any unfermented manure; 4, secure new or other vigorous varieties; 5, plant early and cover well; 6, keep the ground clean; 7, dig as soon as ripe; and 8, sprinkle air-slaked lime over them in the bin or heap.

The *Agriculturist* gives as "an infallible remedy:" "When you drop the seed, put one pint of slaked lime on it, in each hill, and then cover." All antiputrescents, such as lime, wood ashes, pulverized charcoal, plaster, salt, nitrogen, etc., are believed to contribute directly to the health of the potato, as well as to

add to its richness and flavor, and of course to prevent putrefaction and disease.

Renewing the seed from the ball of healthy vigorous plants every few years, even resorting to the native place in South America, and taking the seed from the wild potato, is considered important. Planting on old sod has also sometimes been a complete preventive.

In an essay read before the New York Farmers' Club, by JAMES WARREN, of Monroe, Iowa, potato rot is largely attributed to carelessness in farmers in selecting their seed, it being claimed that seed-potatoes should only be selected from such hills as produce fully ripened potato-balls. This will check the tendency to rot; whereas vitiated seed will naturally be followed by immature and diseased progeny.

Cutting potatoes to plant, is thought by many to promote disease, by impairing the vitality of the seed.

Dr. KLOTZSCH, a distinguished botanist of Berlin, proposed to strengthen the roots by pinching off the extreme points of the tops for half an inch, after they have attained a height of six to nine inches. "The consequences of this check to the development of the stems and branches, is a stimulus to the nutrient center in the plant in the direction of the resource both of roots and the multiplication of the branches of the stem above ground, which not only favors the power of the root, but also strengthens the leaves and stalks to such a degree that the matters prepared by the physiological action of these parts are increased and applied to the formation of tubers, while at the same time the direct action of the sun's rays on the soil is prevented by the thick foliage, and thus the drying up of the soil and its injurious consequences are avoided." The doctor made experiments on his theory, and the pruned plants were readily distinguished in their subsequent growth from the plants beside them, by more numerous branches, larger and darker foliage, and by a greater and better yield.

"In the end of August, the difference between the rows treated by me, and those not treated, became so striking that it astonished all the work people of the neighborhood, who were never tired of inquiring the cause. The stocks of the rows left to themselves were all now partly dried, partly dead. On the contrary, the rows treated as above were luxuriant and in full vigor, the plants bushy, the foliage thick, the leaves large and green, so that most people supposed that they had been later planted."

The Legislature of Massachusetts, a few years since, offered a prize of ten thousand dollars to any one who should satisfy the governor and council that, by a test of at least five successive years, he had discovered a sure remedy for the potato rot. Many communications were received, but none fulfilled the conditions of the offer. There is, probably, no specific infallible remedy.

Hon. AMASA WALKER, Secretary of State of Massachusetts, published an abstract of the recommendations, which we have already furnished to the reader in these pages. Mr. WALKER closed with the following deductions:

"The general conclusions to which the facts presented in these various communications seem to lead us, are:

"1. That the disease has a striking resemblance to the cholera, and probably exists in the atmosphere.

"2. That it is doubtful whether any specific cure has been, or ever will be discovered; but,

"3. As in cholera, certain preventives are well ascertained, by the application of which, the liabilities to disease may be greatly lessened.

"4. That by obtaining the soundest seed, planting in the most favorable soils, and by using the most suitable manures, we may have a good degree of confidence in the successful cultivation of this useful vegetable.

"5. That we may expect, that like the cholera, the potato rot will become less and less formidable from year to year, and eventually subside into a mild and manageable epidemic, if that term may be used in such a connection."

The Sweet Potato.—Is grown very largely, as the principal esculent throughout the Southern States. Two hundred and fifty bushels to the acre is a large yield, under favorable conditions. Its culture is somewhat prosecuted in the Central States, but when raised north of thirty-nine degrees, its growth must be much forced, and it generally lacks the peculiar flavor of the root in its native soil. Still, it will continue to be somewhat grown as an exotic. We will designate the method of its general culture:

Sprouting.—In March or April, in the Middle States, and earlier at the South, put the potatoes in a hot-bed. If they are large, split them lengthwise, laying the flat side down. They may be placed so near as almost to touch each other; then cover about two inches deep

with a light, rich compost made of fine sand, manure, and good soil, or leaf-mold from the woods. When the sprouts push above the ground add an inch or so of the compost. Water occasionally with warm water; keep the bed warm at night, and on warm days give them air and sunshine to render them hardy. When ready to set, the sprouts may be pulled off, or the potato may be lifted out and the best plants selected and the potato returned to the hot-bed. A bushel of seed will produce from three to five thousand plants, and every thousand plants which are set should produce forty bushels of potatoes.

Planting.—A warm, sandy loam is best adapted to the culture. Mark spaces three feet apart, merely scratching the ground for the rows, which should run north and south. On the marks spread barn-yard manure with a fork; then turn up the earth with a plow, from each side, toward the manure, and form a ridge about ten inches high, and finish the ridge with a rake. The base of the ridge, which should be a foot in width, should not be disturbed by the plow. The top of the ridge, when finished, should be flat and three or four inches in width. Plants should be set as soon as all danger from frost is passed.

Planting on Sod.—Sweet potatoes will grow more chubby when planted on sod than when planted in any other way. Strips of sod eight or ten inches wide may be laid in line on the surface of the ground with the grass side up, manure strewed on them, and the earth turned up on each side so as to form a ridge, as directed above; or a piece of pasture or meadow may be selected, and the turf used as the base of the ridge to be formed by the plow. In either case, manure, or rich compost should be used; for, unlike Irish potatoes, these are not injured, but greatly benefited by manure.

Setting the Plants.—A marker should be used to prick off the spaces for the plants, sixteen inches apart. A boy is then able to drop the plants in the right places, and the hole is made for setting them. The plants should then be put in the ground, down to the first leaf. Let one boy drop the plants, another pour from a water-pot, with the rose off, sufficient water to float the rootlets, and immediately fill up with mellow earth. One can water for three to set. Care should be taken to set the plants when the ground is moist, and, if possible, on a cloudy day.

After-Treatment.—Keep the weeds subdued. Use a hoe or rake, raking upward toward the

plants. Where the plants run down the ridges, lift, and lay them on the top. Do this several times during the season, in order to permit the sun to act upon the ground. The sweet potato is not afraid of heat. After every rain, break up the crust of soil in contact with the plants; do this rapidly with both hands—clasping, raising, and pressing the earth on the tips of the hills. It answers all the purposes of a regular hoeing, breaking up the ant holes and giving health to the young plant.

Gathering and Preserving.—For early use, feel in the ridges and nip from the stem those that are fit for use, leaving the others to grow. For Winter use, after the first frost, select a dry, clear day. Cut the vines with a scythe, leaving the stem to which the potatoes are attached three or four inches long, to lift them by. The vines are readily eaten by cattle. Use a fork for raising the potatoes; lift them by the stem and lay them on the ridge to dry. In a few hours they will be ready to pack. Prepare plenty of dry, cut straw (old straw is preferable), and take straw and barrels, or boxes to the field. Select the best potatoes, handling them carefully, without bruising them. Put a layer of straw at the bottom of the barrel, and then alternate layers of potatoes and straw until it is filled. The potatoes should be placed close to each other, one at a time, and handled as carefully as eggs. The barrels are then to be moved to a dry room or cellar, where there will be no frost. If they are placed in a cellar they must be raised from the floor, and must not touch the wall. Keeping cool and dry is the secret of their preservation. They will keep six or eight months, and improve in quality if subjected to a low equable temperature; but the difficulty of keeping them over Winter, much discourages their cultivation in the Northern States.

A very good plan is practised by Dr. PHILLIPS, of Mississippi, first, by laying down a bed of cornstalks several inches thick, which serves as an underdrain and ventilator, leading from the sides to the one in the center. The outside, he also covers with cornstalks and a very little earth, and the whole protected with a temporary roof. It is a very cheap, and with him, an effective way of preserving this most valuable edible root for all the southern portion of the United States. Mr. DELAIGLE, of Augusta, Georgia, raises from 3,000 to 5,000 bushels of sweet potatoes every year. A common crop with him is 300 bushels per acre. His method of preserving them is in an im-

mense root-house, made of bricks, partly below the surface, in which the roots are stored with pine straw, which is one of the best absorbents of moisture he could use, and serves to keep the potatoes free from the dampness so natural to them.

Pumpkins and Squashes.—Species of the genus gourd, and indigenous to both hemispheres. There are numerous varieties, varying in the shape and color of their fruit, as the globular, oval, pear-shaped, crooknecked, green, striped, yellow, marbled, etc. Within the memory of the middle-aged, the number of sorts has greatly multiplied. Many of us can remember the time when there were but two or three varieties; when the kitchens of our grandmothers and great grandmothers were ornamented with long rows of pumpkin, cut spirally, in narrow strips, and hung on harness rods of the old family loom, which found a place, if not in the front room, at least in some room, at times, in nearly all comfortable farmers' families, overhead to dry for domestic use, in making pies, brewing, etc.; then from the well-ripened fruit the old-fashioned pumpkin pie was made, to be passed around with good apple cider, at husking frolics, annually.

In those times no known sort of this vegetable equaled the nice yellow pumpkin, and every family provided for a Winter's supply by storing away some of the nicest and most perfect. The others were boiled with potatoes, and with a mixed provender of oats, corn, buckwheat, and bran of rye, fed to the hogs; which not only increased their growth rapidly, but also rapidly developed their fattening qualities. The cows also came in for a liberal share, which greatly helped in prolonging the milking season.

Later the crookneck squash began to take the place of the pumpkin in domestic use; then other sorts followed, until now we seldom see the pumpkin, and its growth as a field crop is greatly curtailed. Instead thereof we have many varieties of squash, which are an admirable substitute, and some of them much superior to the pumpkin for either domestic or feeding purposes.

As a field crop, squashes are generally as profitable as corn or potatoes, while the direct expense of production is much less, and the soil is not so much exhausted. The value of the produce of an acre in squashes, like all other crops, varies greatly; in favorable seasons, and with fair culture, \$100 or more. As

the hills are wide apart, the amount of manure required is not very large; not over four or five hundred bushels, for fertilizing, to the acre. Frequently white beans may be grown between the vines advantageously, requiring very little extra cost in production, yielding sufficient to cover the cost of the whole culture.

Squashes will grow in almost any soil, but compost manure in the hill is quite acceptable. The culture is simple, and needs little description. Plant six or eight seeds in a hill, at such distances as the variety requires—six to ten feet—when well up, dress out with corn harrow or cultivator; thin to three or four strong plants; keep the ground clean. To increase the squash crop pinch off the leaders a few inches from the hill, until the laterals grow. Different sorts, planted adjacent, are liable to mix. Preserve squashes in a dry place.

The following rank among the best:

Summer Crookneck.—Bushy in habit, rather undersize, bright yellow, warty, sweet; to be used when young.

Scolloped.—(pattypan)—Early, hemispherical in form, deeply scolloped; to be used when half-grown.

Boston Marrow.—An Autumn and Winter squash; very nutritious, thin skin, salmon colored, flesh thick, rich, dry, fine-grained, and of unsurpassed flavor. Introduced by J. M. Ives, of Salem, Massachusetts; an accidental hybrid.

Hubbard.—We are indebted for this surpassing variety to a woman—Mrs. HUBBARD, of Marblehead, Massachusetts. Fruit an irregular ovoid, pointed at the ends, sometimes ribbed; pure, it grows to the weight of eight or ten pounds, and eight or ten inches in length; of a bluish green color, occasionally marked with yellow, or brownish orange; fine-grained, deep yellow flesh, sweet, dry, and of most excellent flavor. Can be used eight to ten months in the year.

Custard.—Of vigorous habit, fruit oblong, gathered in deep folds lengthwise, abruptly shortened at the ends, flesh not very solid or fine, but well flavored. This squash, under careful culture, is one of the most productive. BURR refers to harvests of fourteen tons to the acre. It is receiving much attention as food for stock. Is very hardy.

Yokohama.—Sent from Japan in 1860, by Mr. THOMAS HOGG. The fruit is about eight inches across, roundish, very much flattened at the extremities, and deeply ribbed, weighing from six to eight pounds; stem not as fleshy as the Hubbard, more resembling the pumpkin;

color dark green to orange salmon, skin warty, flesh thick, dry, sweet, and excellent. Earlier than the Hubbard, and not as good for Winter.

Turban or Turk's Cap.—A superior late growing variety, weighing eight to ten pounds. Color greenish, striped with white; flesh orange-yellow, very heavy, fine-grained, dry, and sweet, of good flavor; in perfection when first taken from the vine.

There are a few other good kinds; but the above are representative. Some of these varieties, as the turban and the crookneck, lose their fine texture and delicate flavor in the ranker growth of the West.

For Cattle.—Squashes are much and very profitably used as cattle-food; but it is believed that the seeds should be removed when fed to milch cows, as they have a strong diuretic (urine-producing) effect, and this tends to reduce the flow of milk. The large, "mammoth" squashes are generally the coarsest, and smaller kinds, like the Hubbard, are more profitable food for man or beast.

Saving Ground.—Pumpkins may be planted among corn. The roots of the pumpkin and the corn do not feed on the same nutriment in the earth, hence there will be just as many ears and just as well filled though the pumpkins are thick enough to let a boy walk on them from one side of the field to the other.

The culture of pumpkins in grass lands is spoken of as a very advantageous mode. Holes are dug and filled with manure proper for vines, and the seeds planted. The vines do not begin to run till after the grass is mowed for hay. An acre planted in this way, allowing about ninety hills to the acre, will produce about eighteen tons of pumpkins or squashes.

"Puffing".—Some genius makes the following suggestion, which we give for what it is worth: "If you want big pumpkins and squashes, just bore a little gimlet hole in their rind when the fruit is a few weeks old, and push in a long piece of cotton-wick, with the loose end in a pan of water. The cotton will suck the water, the pumpkin will suck the cotton, and by the time your fruit is ripe, you will have the hugest pumpkin that was ever seen."

Ramie or China Grass.—The South has been blackened and impoverished by a desolating civil war; may it not be that Providence will bring to the hands of its people new sources of wealth, better adapted to their new system of labor, so that a blessing shall ultimately be found at the bottom of the cup of

defeat? The ramie plant promises to reconstruct the prosperity of the South, and it is now attracting wide attention among progressive planters. It produces a fiber, "coming between silk and linen," says the United States Agricultural Report of 1867, "partaking to some extent of the characteristics of both. Of this fiber, the Chinese have made, from time immemorial, their unique and cool summer dresses, equaling, in many instances, the finest linen productions."

This plant, a native of Java (and said to be indigenous to Mexico, also), was introduced into France in 1844, and was finally brought to the United States, in 1867, by Don BENITO ROEZEL. It belongs to the nettle family, and, like hemp, carries its valuable fiber in its stalk. This fiber is of pure white, of a silken appearance, finer than cotton, or flax linen, and stronger than either. It can be used separately in the manufacture of cloth, or can be combined with silk or wool. In a warm latitude, the plant is hardy and vigorous; it grows with great productiveness in Louisiana and Mississippi; it is not affected by long periods of rain, and stands dry weather as well as cotton.

It thrives even in Mexico, where the rainy seasons are so long. The crops are taken, like those of cane, by cutting at the ground. From the ratoons spring new growths, more vigorous than the old. It is believed that in South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas, the ramie will succeed admirably; have rampant growth, and yield three or four crops a year. It takes two years to become established; but once stocked, it remains productive for a number of years. It is said to yield eight hundred pounds of lint to the acre, from each cutting, or, in a good season, twenty-four hundred pounds per year.

The following are some of its remarkable qualities, as summed up by a Mississippi paper:

"1. The ramie is stronger than European hemp.

"2. It is fifty per cent. stronger than the best Belgian flaxen or linen fiber.

"3. The fiber may be spun as fine as that of flax, and will prove twice as durable.

"4. It is a vigorous grower, and will produce the greatest amount of textile fiber of any plant known.

"5. It will produce, in the belt in which it flourishes, from three to five annual crops, each equal to the best gathered from hemp.

"6. It promises eventually to supersede, in

some countries, the general use of cotton and linen fabrics."

The head of a prominent commercial house in Liverpool, speaks of its value in glowing terms. He refers to the plant as "yielding a fiber so textile, yet so beautiful withal, that it can be treated to rival silk and to supersede the finest of cotton."

In a warm latitude the plant is perennial. It is propagated, not only by root divisions, but with perfect ease by cuttings, by layering, and by planting the seed. From one root, planted in March 1867, Mr. F. J. KNAPP reports an increase of a hundred; and from layers and cuttings of the same more than a thousand. It is stated that in one instance a hundred roots in nine months produced forty thousand plants. During 1867 and 1868, the plants sold at one dollar each in the South.

Ramie likes a rich sandy soil, but flourishes almost anywhere. "The culture," says the *New Orleans Picayune*, "is similar to that of cane; and as the plant, when once set, is hard to eradicate, grows vigorously, and defies the influence of grass or rival plants, cultivation is only needed to promote its growth."

The St. Louis *Journal of Agriculture* gives the following suggestions for the culture of the ramie: "It can not be too much recommended to have the piece of land intended for the ramie deeply cultivated; subsoiled to fourteen inches would not be too deep, and this is the most laborious work in the whole cultivation. The field ought to be laid off in pieces of about twenty rows in width, and a passage left for a cart or wagon. The rows ought to be about four feet apart, and the plants in the rows half that distance. When the field is ready for planting, a furrow is made every four feet, about three to four inches deep, and in these furrows the plants are placed, with little more care than negroes plant sweet potatoes. The furrows ought to be made so that the rain will not stand too long, yet all heavy washing ought to be prevented. Rooted plants as well as layers ought to be covered with earth nearly to the top; roots ought to be covered with earth two or three inches deep. In case some plants or roots should not grow, the vacancies should be filled as soon as possible, and always the best plants taken for this purpose, so as to get an even-growing field.

"As soon as the plants have reached seven to eight inches in height, they should be topped (as in the nursery), to force out side shoots. When these latter are grown to about five or six

inches in length, the plant has a kind of bushy appearance; then it is hilled nearly to the top. It is now left to grow until it has reached nearly to the height of three feet, when it is cut down even with the ground, or better, one inch below. The fiber of this first growth can be used, but is not perfect yet, because the roots and bulbs are not large enough, and there are as yet too many side-shoots. A few days after this cutting, a great many ratoons will make their appearance on the surface. The whole work now consists in keeping out the weeds. This second growth will be, under similar circumstances, a great deal more rapid than the first was; and can be cut when about four feet high; each growth will have fewer side-shoots, and soon they will disappear altogether.

"The planting in the field ought to be done in the Spring, but can be continued until the beginning of September. Those which are planted late ought to be covered in Winter with straw or leaves, because they are too young and tender to resist severe frosts. Those planted early in Spring and Summer do not need any protection, as they will make roots eighteen or twenty-four inches deep.

"The first year, weeds have to be cut out, but this will give but little trouble. The second year the plant will have so many ratoons that other plants will have no room to vegetate. From this time the cultivation will give very little trouble, except one plowing between the rows early in the Spring, and after each cutting, and manure over the fields during the Winter season. "All refuse matter falling off in cleaning the fiber, ought to be fed, or cured, and put in the barn for Winter use. All the manure coming from the plant ought to be carefully gathered and put back on the field. In this way, such a field will give a rich return for many years, without need of being replanted. The plant can be grown as far North as the earth does not freeze more than four inches deep in Winter."

As a general rule, it may be said, as soon as the stems have reached a little more than four feet, the fiber will be of good quality, but does not get hurt if left uncut until it reaches eight to ten feet in length. P. L. SIMMONDS, editor of the *Technologist*, says of it: "So rapid is the growth of this plant, that, by careful observation, the Colonial Botanist of Jamaica found one of its shoots attain the height of six and a half feet in fourteen days, and ultimately eight and a half feet; but in good land it would exceed this by two feet, while in China and the East In-

dies, where it is highly cultivated, eight feet is the height mentioned it now makes, from which fiber six feet long is obtained."

The *Southern Ruralist* says: "Suppose this plant to have none of this useful fiber, its cultivation would be of immense value as food for stock, in a great many portions of the South. Another most important point in introducing the ramie here, is its easy cultivation. The first year it requires no more work than sweet potatoes, and then the main work is in harvesting. In case a field should be plowed up after a series of years for some other purpose, then the roots and bulbs will make excellent food for hogs, or can be manufactured into a durable dye.

"The fences have to be kept in good order, because if cows and hogs are once accustomed to it, they will break down a poor fence to get to it. During the Winter cows can be turned into ramie fields, but hogs and horses should be kept out. So far this plant has no destructive enemies. The so-called nettle worm makes its appearance some seasons, but never hurts the fiber; it is satisfied with the lower leaves of the plant, and is in this way harmless. Besides, if they were as destructive as the cotton worm they could not injure the crop very much, as each cutting is matured in a very short period of time."

The United States Agricultural Report for 1867, thus sums up: "The beauty, durability, and value of the fabrics made from this fiber are unquestioned; the desirability of its success as an important accession to the products of American agriculture is conceded; the only point to be made clear at the present time is the profit of the production. Will it pay? That is a more difficult question, and one that should be answered; all present experiments should be directed to its solution. Then how can it be most successfully and economically grown? The plant will grow; it may yield a large product per acre. How, especially, shall it be most cheaply and most efficiently prepared for the market? and, finally, what modifications and improvements in its manufacture can be made to insure a large demand for the raw material?

"The drawback to its more general use is its brittleness, which prevents weaving it by machinery, while the Chinese hand-loom is inadmissible in these days of steam and water power. Therefore, it is not used alone, but always in combination with other material, the warp generally being cotton, the weft ramie. A chemical process of treating the fiber has re-

sulted in producing, in combination with cotton, an article resembling the best mohair, a stiff, strong, and cool texture, silky and beautiful. It is possible, perhaps probable, that further discoveries in this direction may give a tenfold impetus to the manufacturers' demand."

We do not wish to close without a word of caution. *Difficulty has been experienced in working up the fiber*, and little use has as yet been made of it, either in Europe or America, except to aid the New Orleans speculators in root-cuttings. These men falsely state that the plant will not grow from the seed. HON. HORACE CAPRON, United States Commissioner of Agriculture, in his report for April, 1869, thus sums up the present *status* of the ramie: "The economical utilization of the fiber by improved processes and skilled labor is a great desideratum; but the plunder of hopeful experimenters by extortionate prices (for a plant that will grow like willows) obtained through misrepresentation and gross exaggeration, will not be abetted by the Department of Agriculture. It has been planted throughout the extreme South, and everywhere grows luxuriantly, and gives assurance that unlimited quantities of material for fiber could be produced. I am not disposed further to encourage its growth until manufacturers perfect processes, and invent or adapt machinery for preparing and manufacturing the fiber so economically that a great demand shall spring up for the raw material. All depends upon the successful attainment of such an end. The farmer of this country can answer any demand for it, but will wait till the draught is made upon him."

Rape.—This is a vegetable of the cabbage tribe, cultivated extensively in Europe, and to some extent in this country, for its seed, which is used for the manufacture of oil, and also as food for cattle and sheep in Winter and Spring. General C. S. HAMILTON, of Fond du Lac, Wisconsin, recommends its more general cultivation among American farmers, because of "the uniform success that has attended its growth, the ease with which the crop is put in and harvested, and above all the quick return and high remunerative price which it brings." We quote further from the same authority: "Much prejudice has existed against the crop in the minds of American farmers, through fear, that, like mustard, the rape is hard to eradicate from the soil. No greater error can exist. The plant is exceedingly tender when young, is completely killed by a sin-

gle frost, and the seed is so tender that it cannot be made to preserve its vitality in the ground over Winter, by any possible means. It is as harmless for self-propagation as a crop of corn or beans.

"The advantages to the farmer over other crops, may be summed up as follows:

1st. *Time of Seeding.*—The best time is from the 10th to the 25th of June, in the northern section of the Union—a season in which the farmer has comparatively little to do with his other crops. If the crop is to be put on old land, it should not be plowed until just before seeding. By this means, all weeds and grass are turned under, and the rape seed germinates at once, completely covers the ground with its broad leaves, and gives little chance for any other plant.

"2d. *Cost of Seed.*—Two quarts sown broadcast, and lightly harrowed in, are sufficient for an acre, the cost of which does not exceed fifteen to twenty cents.

"The crop sown during the last half of June, is ready to be cut during the first half of September, after wheat and other cereals are out of the way. It can be cut with cradle, scythe, or mower; must be cut before it is ripe enough to shell; should lie upon the ground until dry enough to thresh, when it may be handled with pitchforks, drawn to the barn-floor, and trodden out with horses, or threshed with flail as fast as hauled in. It shells with such ease, that a pair of horses will tread it out as rapidly as two teams can haul it in. If hauled any considerable distance, an old canvas or sheet should be spread on the wagon-rack. It is readily cleaned in an ordinary fanning-mill, and is ready for market before any other crop.

"3d. *Yield per Acre and Price.*—During the seven years past, the crop has averaged fully as much as wheat per acre. In the town of New Holstein, Wisconsin, where more seed is probably raised than in any other single township, the average yield this past season has exceeded nineteen bushels per acre, of fifty-six pounds per bushel.

"The price of seed is governed in a great measure by the price of oils, and ranged during the past season (1865) \$2 25 to \$2 75 per bushel, and this with less expense and labor in seeding, harvesting, and threshing, than is bestowed on any other crop." It is admirably adapted to prairie and clay soils, and is excellent to prepare ground for Winter wheat. CLAU OESAU, of New Holstein, Wisconsin, has done much to introduce rape culture in the Northwest.

Rice.—Rice has long been known and cultivated in India, and all Southern Asia, wherever the land would admit of being flooded. It is an amphibious plant, thriving best in wet land; indeed, scarcely thriving at all where the soil is not much of the time submerged, as in Louisiana, and along the Carolina sea-board. In the hilly part of Java the mountain rice is planted on hill-sides, where no water but rain can come; but it is planted in the beginning of the rainy season, and reaped in the beginning of the dry season.

The best rice is that raised in our Southern States; it is larger and sweeter than that of India, which is small, meager, and much less nutritious. Rice has some excellent qualities as an article of diet, but it contains only four per cent. of gluten and fat, to eighty-five per cent. of starch, and therefore, naturally enough, most persons use it as an auxiliary, rather than the chief food.

There are various methods of cultivating and dressing rice practiced in different countries: The following is the mode which Captain BASIL HALL observed in Carolina:

"The grain is sown in rows in the bottom of trenches made by slow labor. These ridges lie about seventeen inches apart, from center to center. The rice is put in by hand, about the 17th of March, generally by women, and is never scattered, but cast so as to fall in a line. By means of flood-gates the water is then permitted to flow over the fields, and to remain on the ground fifteen days, at the depth of several inches. The object of this drenching is to *sprout* the seeds, as it is technically called. The water is next drawn off, and the ground allowed to dry, until the rice has risen three or four inches. This requires about a month. The fields are then again overflowed, and they remain submerged for upward of a fortnight, to destroy the grass and weeds. These processes finish about the 17th of May, after which the ground is allowed to remain dry till the 15th of July, during which interval it is repeatedly hoed, to remove such weeds as have not been effectually drowned, and also to loosen the soil. The water is then for the last time introduced, in order that the rice may be brought to maturity; and it actually ripens while standing in the water. The harvest commences about the end of August, and extends into October. It is all cut by the male slaves, who use a sickle, while the women make it up in bundles.

"From the pedicles the rice must be sepa-

rated by a hand-flail, as no machinery has yet been devised for effecting this purpose. The next process is to detach the outer husk, which clings to the grain with great pertinacity. This is done by passing the rice between a pair of millstones removed to a considerable distance from each other. The inner coat, or film, which envelops the grain, is removed by trituration in mortars, under pestles weighing from two hundred and fifty to three hundred pounds. These pestles consist of upright bars shod with irons, which, being raised up by the machinery to the height of several feet, are allowed to fall down upon the rice, the particles of which are thus rubbed against one another till the film is removed. It is now thoroughly winnowed, and being packed in casks holding about six hundred pounds each, is ready for distribution over all parts of the world. Each plantation has a mill. Though rice is now so largely cultivated in Carolina that it constitutes the chief produce, the swampy land being well suited to it, it is not used so much for food in America as maize and wheat, and it is mostly raised for exportation, the Carolina rice being found superior to every other. The cultivation of it is the most unhealthy work in which the negroes of Carolina are employed. They are obliged frequently to stand ankle-deep in the mud, with their bare heads exposed to the fierce rays of the sun. The consequence is, that numbers sink under it and die. At the unhealthy season, when the harvest commences, all the white proprietors leave the spot, and go to higher ground or to the North."

A profitable rice plantation can not be established without a large capital and much hard labor, but under favorable conditions it becomes a remunerative crop. Rice was formerly exported after being cleansed and prepared for commerce and use, but most of the export of late years has been in the form of paddy—unhulled rice—this condition being deemed most favorable to its preservation. The export of the present century has averaged two million and a half to three million dollars a year.

Rye.—Rye is not a favorite cereal; it belongs among the plebians and is expected to do much of the agricultural drudgery. It is very patient under neglect, and will bear more abuse than any other crop; yet there are few crops that will pay better, proportionately, for care and good culture. "With the application of a small quantity of fertilizers," writes WILLIAM H. WHITE, "it may be grown year after year

on the same ground, with better results than any other crop. Owing to this quality it has been grown on much good land at the North so often, without manure, successively, that it has proved nearly fatal to the fertility of the soil.

"Often when wheat could no longer be grown at a profit, rye has been made to take its place, and remunerating crops have been realized without manure, the only rotation bringing grass or weeds, occupying the place of a fallow. It has been, and still is, practiced to some extent—although new ideas and improved agriculture have in a measure done away with the practice—to turn up an old field which has been in pasture, and sow it to rye without manure. An old sand plain which has lain dormant for a year or two, is often used for a rye field, and in return ten to fifteen bushels of rye is often realized, which usually satisfies the expectations of the producer; this, with the straw, will be a fair paying crop for such land." But with the application of four or five cords of rich compost to the acre—more might be too strong for the good of the grain—a heavier crop may be anticipated. The best soil for rye is a rich sandy loam, naturally dry—a rather loose subsoil, capable of passing off the water when an excess has by any means accumulated on the surface. On such a soil the yield is usually satisfactory; the grain is heavy, and makes an excellent article of flour for family use. New cleared forest land produces luxuriant crops, showing that rye delights in a soil well stocked with pabulum. This grain may be sown earlier or later than Winter wheat, but the best crops are realized when sown in September, in the North, as then it becomes well rooted to stand a hard Winter; if it gets up large, it may be fed off, without detriment, by calves, cows, or young stock. Where wheat is uncertain, it is often made to follow corn, tobacco, etc. Sometimes, from the press of work or other causes, it is not sown till just as the ground is freezing up for Winter, when the seed lies till Spring before it starts into growth. In such case it has every quality of Winter rye sowed earlier, although maturing later in the season.

The culture and harvesting of rye are so nearly like those of wheat, elsewhere treated, that little room need be given to their consideration here. The whiteness and sweetness of rye flour depend on the soil in which the grain is grown, as much as on the skill of the miller. A close, heavy, or hard soil, will not produce

grain that will make as light sweet flour as one of a different description.

In England rye is little raised except as a green crop, and when fed off early in Spring the land is invigorated and will bear an excellent harvest of roots the same year. Many sheep raisers in this country profitably grow rye, for pasture in the Fall, after other crops are gone. It will never be much grown except for soiling or the distillery, in regions where wheat flourishes.

Number of bushels annually produced in the United States amount to about twenty million—of which one-half grows on the soil of New York and Pennsylvania.

Sugar Crops.—Sugar is one of the most important articles which commerce has brought into general use. As a condiment and nutriment it is extensively employed in a great variety of articles of food; it forms the basis of all kinds of confectionary; it is largely used in the preservation of fruits, and also, in connection with other articles, in the preservation of fish and meats; for medicinal purposes, sugar is among the most valuable of demulcents, and is also a gentle aperient; aside from being of value for its direct medicinal qualities, it is universally used as a medium for administering many active remedies, for disguising the disagreeable taste of others and preserving mixtures from change.

Important as sugar is now regarded, it was mostly unknown to antiquity. Sweet calamus and cane are alluded to by the Old Testament writers, but in language that indicates little knowledge of their use, and honey seems to have been their chief saccharine reliance. The first mention of the boiling of the sugar-cane comes to us from the fifth century, and the Saracens introduced it to Europe, *via* the Levant. The cane is regarded as a native of America, an inference from the fact that it grows very readily and productively, under favorable conditions, in our Southernmost States.

Sugar is one of the ordinary products of vegetation, and different varieties are extracted from common sugar-cane, sorghum, beets, Indian corn, maple trees, grapes, and other fruits, chestnuts, pumpkins, potatoes, and a large number of tropical plants. The sugar product of the world, as it was known to commerce in 1861, was as follows:

Cane sugar.....	1,930,000 tons.
Beet sugar.....	430,000 "
Palm sugar.....	100,000 "
Maple sugar.....	20,000 "
	2,520,000 tons.

Beet Sugar.—The exorbitant price of sugar that prevailed during the late civil war, induced some enterprising manufacturers of Illinois to begin on a large scale the extraction of sugar from the beet. Considering that we pay nearly \$100,000,000 annually for foreign sugar, and that this may be made from the beet at less than half the present price of sugar from the cane, it would seem to be the part of wisdom to cultivate it more largely.

HON. HORACE CAPRON, United States Commissioner of Agriculture, wrote, in 1868, an interesting letter on this subject, from which we extract: "A manufactory of beet sugar was in successful operation in Silesia as early as 1805; and in France repeated experiments were undertaken a few years later. Up to 1818, no very marked or rapid progress was made, though the business was constantly extending. In 1839, the manufacture, already established upon a solid footing, embraced the operation of two hundred and sixty-eight factories in France, Germany, Sweden, and Russia.

"In 1848, France had 294, Prussia 346, and Russia 425. The present number of factories in France, according to DE NEUMANN, is 499; many of them are more extensive than those of former days, and fourteen of the number have been established during the past year. On the first of January, 1868, 3,173 refineries of beet-root sugar were reported as in operation in Europe. The total product, in 1828, is stated to have been 7,000 tons; in 1851, 180,000 tons; and in 1867, the enormous quantity of 663,000 tons, or 1,485,120,000 pounds, worth \$100,000,000 or about seven cents per pound.

"Sixteen years ago, France was able to manufacture half of her total consumption of sugar, or 60,000 tons; Belgium, consuming 14,000 tons, imported in 1851 but 4,000 tons. Germany, on the same date, produced 43,000 tons; Austria, 15,000, and Russia, 35,000 tons; the latter country also importing, at the same time, 50,000 tons of sugar in addition to the home product. The total manufacture of Europe as stated above, has been almost quadrupled since that date, and cane sugar in several of those States is now scarcely known. The amount manufactured in France during the three months ending November 30, 1857, was 120,553 tons—18,613 more than was made in the same period of the previous year.

"As an illustration of the extent of such a business, a record may be cited of an establishment for obtaining sugar by infusion of

dried beet, at Waghausel, near Carlsruhe, in the duchy of Baden, in which 3,000 people were employed, a capital of eighty millions of francs (\$16,000,000) used, and twelve acres of land covered with buildings.

"The product of the beets per acre is from fourteen to fifteen tons in France and Belgium. Enormous crops have occasionally been reported. The English *Gardener's Chronicle* contains the statement of M. DEGASPARIN, of twenty-seven tons seven hundred weight grown upon thirty-nine perches sixteen square yards, or nearly one hundred and ten tons per acre. He sowed the seed under glass, transplanted the plants in April, hoed repeatedly, and irrigated every two weeks.

"A ton of beets yield about one hundred pounds of raw sugar. At first the proportion of sugar obtained was about three per cent. It was increased to six, and even seven and a half per cent.

"The beet cake for feeding purposes, the molasses, alcohol, and other products obtained, greatly increase the aggregate which makes the total value of this branch of industry. Beet-sugar districts become so enriched that far greater amounts of the cereals and other products of agriculture are obtained than before beet factories were known.

"The growing of the beet requires rotation, as well as thorough culture, and careful weeding. It would therefore be a boon of untold value to our wheat-producing districts of the West, which are decreasing year by year in returns for labor expended from these causes, and the additional neglect of stock-growing.

"The large and increasing quantities of sugar and molasses required for consumption in this country, and the amount of money paid for foreign labor in its production, can be appreciated by a glance at the following statement of imports for five years, which is in addition to a small domestic product of cane, maple, and others, and large quantities of sorghum syrups; a small amount, also, by indirect trade, is not included, on account of incompleteness in the official statement of imports:

	SUGAR.		SYRUP AND MOLASSES.	
	Pounds.	Dollars.	Gallons.	Dollars.
1852	557,137,529	30,357,090	29,157,380	3,427,813
1853	518,504,461	17,082,017	31,206,946	4,732,378
1854	632,230,217	29,660,576	35,573,130	7,236,084
1855	608,855,989	25,248,299	43,399,003	7,471,047
1856	977,885,149	39,595,677	47,318,438	7,227,351

"Here is a total of \$133,943,150, gold value,

paid for foreign sugar in five years, and \$30, 115,073 for molasses, an average of about \$33, 000,000 per year, and more than \$50,000,000 in currency, the most of which, if not all, should be retained at home. In view of the great success of the business in Europe, the American people owe to the world's estimate of American enterprise a determined and persistent effort for its establishment here."

Mr. CAPRON further elaborated these views in the Agricultural Report for 1867: "Our present annual consumption amounts to \$60, 000,000, of which we produce only a moiety. The domestic production in 1859, as returned by the census, was, of cane sugar, 230,982,000 pounds; of maple, 40,120,205 pounds. The cane-sugar interest, though advancing slowly from its depressed condition during the war, yielded in 1867 not exceeding 40,000,000 pounds. Of beet sugar there was produced, during the last season, by the establishment at Chatsworth, Illinois, 1,000,000 pounds. Other companies have been formed in Illinois, in California, and in Wisconsin.

"When we consider the enormous outlays upon a cane-sugar plantation, for the necessary buildings and machinery for its manufacture, reaching, in some cases, \$100,000, and that this is only required to be in operation two months of the twelve, it becomes an important inquiry how the manufacture of sugar from the two substances may be combined to advantage. Chemical analysis of sugar-beet, at different periods of its growth, by Professor ANTISELL, the chemist of the department, shows that it is most productive of saccharine matter, in this latitude, in the months of July and August, or during the prevalence of alternate showers and warm sunshine. In Louisiana the beet-seed may be sown in January; the beet would attain its greatest perfection in April and May, a time most propitious for that climate. The machinery, with slight additions for rasping and preparing the root, may then be put into operation and continued upon the beet until the cane is ready for use, and again, when the cane is exhausted, placed upon the dried beet for the remainder of the year."

Dr. THOMAS ANTISELL, chemist, made an interesting report to the Department in 1867, the result of a variety of experiments with the beet for sugar purposes. From this we quote: "The Castelnauudy Yellow, White Magdeburg, Vilmorin's Improved White, and the Improved White Imperial are the varieties which yielded the largest amounts of sugar. The sudden fall-

ing of the sugar per centage at the close of September in all the varieties is remarkable; and as toward November, although the per centage of sugar increases, it never attains what it was in the middle of September, it is evident that there is no advantage in delaying the pressing of the roots beyond the 10th of September, and that nothing is gained by allowing the beets to remain in the ground after the 1st of October.

"The greatest yield of juice in the majority of the varieties was obtained within one month of the plant growth, from about the middle of August to the middle of September. Thus the maximum volume of juice at different periods in growth of the several varieties were as follows: White Silesian Red Top, August 17 to 27; Improved White Imperial, August 17 to 27; Vilmorin's Improved White, August 21 to September 6; White Silesian Green Top, September 9 to 30; Beta Imperialis, No. 1, September 17 to October 3; Beta Imperialis, No. 2, September 17 to October 3; White Magdeburg, September 23 to October 7; Castelnauudy Yellow, October 10 to 17."

It is not probably practicable for farmers to manufacture their own beets into sugar for domestic use. The result on so small a scale could not be commensurate with the expense. The better way would be, as in the case of the cider-mill, to make one manufactory suffice for the wants of a considerable section of country. To this the beets, either in a green or dried state, could be transferred at the proper time and sold at a given rate per ton, or be manufactured at so much per pound, as might be agreed upon by the parties to the arrangement. If the beets are to be transferred to a factory and the distance is considerable, the best way would be to cut the roots into small pieces—first washing them—and then drying by artificial heat. This will evolve eighty odd per cent. of their weight, correspondingly diminish their bulk, leaving a residuum containing about fifty-five per cent. of sugar, which is extracted by infusion after months of delay, if this becomes necessary.

Cane Sugar.—By this, reference is had to sugar made from the common cane. This cane is very sensitive to frost, and can only be grown south of 32°—the latitude of Vicksburg, Mississippi, and Savannah, Georgia. The crop is sometimes destroyed, even in Louisiana. Of the 230,000,000 pounds cane sugar annually raised in the United States, Louisiana had produced, up to 1860, 221,000,000 pounds. The

importations of sugar into the United States in the same year (1860) were as follows :

Brown sugar, pounds.....	692,944,872
Loaf and refined, pounds,	771,334
Molasses, pounds.....	86,352
White clayed powdered sugar.....	1,025,639

These figures show how small a proportion of the sugar consumed in this country has been raised within its limits; this, too, in a year during which there was no unusual interference with the industry. It will be seen that we produce less than one-third of the sugar which we consume.

Sugar-cane is indigenous to both the East and the West Indies, and was transplanted to Louisiana about 1750. The first sugar-mill in the United States was erected in 1758, by M. DUBREUIL, on his plantation, just below the present site of New Orleans. From this beginning the cultivation of sugar prospered to such a degree that in 1770 it formed the staple export of the colony, and, after our revolutionary war, was prosecuted so vigorously by emigrants from the United States, that, upon the delta of the Mississippi river alone, there were eighty-one sugar plantations in 1803, at the date of the cession to the United States of the territory of Louisiana.

The principal variety of the cane grown in Louisiana is the Striped Ribbon or Java, the hardiest that has been found. An average crop is one and a half hogsheads of sugar and one hundred and fifteen gallons of molasses to the acre.

Soil and Seed.—The sugar-cane thrives best in a rich sandy loam, plentifully supplied with lime and phosphates. The plant is grown from cuttings, and these ought to be carefully selected from the ripest and strongest cane of the previous year, and preserved in a "bed" two feet deep in the field, to protect it from frost and sun.

Cultivation.—The plant grows in a succession of joints, from four to twenty feet high, the stem being from one to two inches in diameter; long, slender leaves shoot out from the opposite sides of alternate joints, and fall off when the plant comes to maturity. When from eleven to twelve months old, a sprout without joints, called the "arrow," grows seven or eight feet above the top of the cane, terminating in an ample panicle with numerous white flowers. Seeds, however, are rarely ripened by the cultivated cane.

The method of planting varies in different countries. The general practice, however, is, after breaking up the land deeply, to run

straight, parallel furrows, at a distance of from four to six feet apart in the West Indies, or eight feet apart in Louisiana. Slips of cane, each having several joints, are placed in these furrows and lightly covered. Some planters lay from two to four canes in each furrow, lapping them the whole distance. The cane sprouts at the joints, usually throwing up but a single shoot to the slip, although there may be several joints. In the West Indies the cane is planted from August to November, and in Louisiana from January to March. When the young plants make their appearance, the rows are plowed and hoed, the process being repeated often enough to keep the ground free from weeds. When the cane is large enough to shade the ground—which should be early in June—the last deep furrows are run, and left to drain off the surplus water.

Harvesting—The first crop of cane is removed in Louisiana in October following the planting, care being taken to cut the cane two or three joints above the ground. From one of these joints—the "ratoon"—a new shoot springs up, which is the cane of the following year. The "ratoon" is not so strong and vigorous as the "plant canes," but yet affords better juice, and is more readily converted into sugar. In Louisiana a succession of three crops can be depended on from one planting, or, in other words, the cane needs to be planted only once in three years. In the West Indies the "ratoons" continue to renew themselves, sometimes for more than twenty crops. As it takes the entire cane growing upon an acre of ground to replant itself and three acres adjoining, or one-fourth the cane every third year, the planting of the cane has been a serious drawback upon the sugar interest. Planters were loth to part with so considerable a portion of their product, sought to make the burden lighter by devoting the smaller and inferior canes to planting, and crushing the sounder ones. This led to a serious deterioration in the quality of cane, and resulted in a gradual decrease each year of the yield of sugar. To remedy this evil the United States government, but a short time before the breaking out of the rebellion, collected a new supply of fresh and vigorous canes from the northern portion of South America, and distributed them among the planters. The war prevented the collection of statistics to show how much the crops were improved by the introduction of new canes.

The juice is expressed and reduced to sugar by the use of heavy and expensive machinery

The present product of a hundred pounds weight of sugar-cane does not exceed nine pounds weight of sugar, whereas the natural contents are about eighteen. A new method is advertised, whereby nearly the whole of the natural contents can be extracted.

Corn Sugar.—This is produced either from the grains or from the stalks of Indian corn. We copy from an essay by WILLIAM WEBB, of Delaware. "The results of my experiments have been encouraging. The manufacture of sugar from Indian corn, compared with its extraction from the beet, offers many advantages. It is more simple, and less liable to failure; the machinery is less expensive, and the amount of fuel required is less by one-half. The quantity of the sugar produced on a given space of ground, is greater, besides being of better quality. The raw juice of maize, when cultivated for sugar, marks 10° on the saccharometer, while the average of cane juice (as I am informed) is not higher than 8°, and beet juice not over 3°.

HON. H. L. ELLSWORTH, in one of his publications, states, as the result of actual weighing and measuring, "that corn, sown broadcast, yielded five pounds of green stalks per square foot; this is at the rate of 108½ tons to the acre. In the first place, it has been satisfactorily proved that sugar of an excellent quality, suitable for common use without refining, may be made from the stalks of maize, and that the juice of this plant, when cultivated in a certain manner, contains saccharine matter remarkably free from foreign substances.

"A conclusion from my observations is, that if the ears were taken off in their embryo state, the whole quantity of saccharine matter produced by the process of vegetation would be preserved in the stalk, from which it might be extracted when the plant was matured.

"Grain is produced in the West in such overflowing abundance that the markets become glutted, and inducements are offered to employ the surplus produce in distillation. This business is now becoming disreputable. The happy conviction is spreading rapidly, that the use of alcohol, as a beverage, instead of conducing to health and strength, is the surest means of destroying both. Some other production, therefore, will be required, in which the powers of our soil may be profitably employed. This, it is hoped, will be found in the business now proposed. Instead of distilleries converting food into poison, we may have sugar-houses, manu-

facturing at our doors an article of universal demand, not merely useful, but necessary, furnishing, as it does, one of the most simple, natural, and nutritious varieties of human sustenance found in the whole range of vegetable production."

MR. ELLSWORTH details the method of planting—broadcast or with a drill—and after cultivation, when he continues: "The next operation is taking off the ears. Many stalks will not produce any; but whenever they appear, they must be removed. It is not best to undertake this work too early, as, when the ears first appear, they are tender, and can not be taken off without breaking, which increases the trouble. Any time before the formation of grain upon them will be soon enough.

"Nothing further is necessary to be done until the crop is ready to cut for grinding. In our latitude, the cutting may commence with the earlier varieties about the middle of August. The later kinds will be ripe in September, and continue in season until cut off by the frost. The stalks should be topped and bladed while standing in the field. They are then cut, tied in bundles, and taken to the mill. The top and blades, when properly cured, make an excellent fodder, rather better, it is believed, than any hitherto used; and the residuum, after passing the rollers, may easily be dried and used in the same way; another advantage over the cane, which, after the juice is expressed, is usually burned.

"The mills should be made on the same general principle employed in constructing those intended for grinding cane. An important difference, however, will be found both in the original cost and in the expense of working them. Judging from the comparative hardness of the cane and cornstalk, it is believed that one-fourth part of the strength necessary in the construction of a cane-mill will be amply sufficient for corn, and less than one-fourth part of the power will move it with the same velocity."

The process of manufacture and crystallization is described as somewhat similar to that of the syrup of sugar-cane, but the novice will probably need to experiment with some patience before thoroughly mastering the conjury.

The *Dubuque Times* says: "MR. THOMAS RANDOLPH, a farmer of this county, residing between Worthington and Cascade, informs us that he has tried the experiment of making molasses from sweet corn [stalks]. He says it is superior to that made from sorghum or

imphee. The cornstalk yields as much molasses as the sorghum. He promises to send us a sample, when we shall have the quality tested by judges and report their decision. If it sustains Mr. RANDOLPH'S opinion, it will be of no small consideration to our farmers, as the sweet cornstalk will mature in this latitude when the sorghum and imphee will not. Mr. RANDOLPH used his cornstalks immediately after he had removed the crop of ears for table use."

Sugar from Indian Meal.—The discovery of obtaining "glucose," a liquid or gummy saccharine substance, from starch, was made in 1811 by a Russian chemist, EMIL KIRCHOFF. It has since been largely manufactured in all the countries of Central Europe, and is much used as the basis of champagne. The granulation of starch sugar was accomplished in 1854, by JOSEPH HIRSCH, a Munich chemist, now resident in Chicago.

Cane sugar is understood to be two and a half times as sweet as corn-starch sugar. The syrup made from corn starch and sugar-cane contains, in one hundred parts, the following constituents:

	Corn.	Cane.
Sugar.....	41.46	43.15
Dextrine	22.17	
Water	34.25	33.49
Salts.....	1.12	2.17
Caramel.....	.....	21.19
	100.00	100.00

"The yield of sugar," says the *Chicago Times*, "is about sixty pounds to one hundred pounds of corn meal—the yield of syrup, of the proper density and sweetness for table use, being about seventy pounds. The crystals of the sugar are much smaller than those of cane sugar. The sugar is not liable to change back into syrup, or even to become soft or moist from absorption of moisture from the atmosphere, and, when the syrup is properly made, it is not liable to become hard or congealed into cakes. It can be made as clear and transparent as water, and possesses a flavor peculiarly its own, and pronounced superior to that of maple molasses, though by no means similar to it. It is by far the most pleasant to the taste of any sweet so far discovered."

Extracting the Starch.—The *Times* gives the process of Mr. HIRSCH, by which the manufacture of corn sugar was begun in Chicago: "The first thing to be done is to manufacture the corn into starch. Less care and attention are bestowed upon its manufacture than where the starch itself is to be made an article of com-

merce, the object being simply to extract all the starchy portion of the grain. The corn is first ground into very fine flour or meal; the finer it is ground, the more easy and satisfactory the future process. It is then mixed with water to about the consistency of thin cream, and kept thoroughly agitated for some time, and is then run slowly into a cylinder made of fine wire gauze, revolving very rapidly. As the cylinder revolves, the water flies off through the gauze, carrying with it the starchy portion of the grain, and leaving behind it in the cylinder the glutinous portions. The cylinder is stopped every few moments, and the gluten, which adheres closely to the sides, removed with scrapers.

"The starch water is conveyed to a vat, and allowed to settle, which it does in a few hours, the starch going to the bottom, and the water, which is quite yellow, collecting at the top. The water is drawn off, and clean water introduced, and the starch stirred thoroughly into it, and again allowed to settle. This operation is continued several times, and has the effect to wash out from the starch much of the coloring matter, which would be much more difficult to remove at a later stage in the process. When the starch has been sufficiently washed, no new water is let in, and the starch soon thickens and hardens at the bottom to about the consistency of stiff clay, in which condition it is used.

"The corn contains from thirteen to seventeen per cent. of gluten, and from sixty-five to seventy-five per cent. of starch, the remainder being water, husks, salts, etc. The gluten is used in large quantities in dyeing establishments and in cotton mills, as a medium for fixing or setting colors. It is said that the beautiful color of ultramarine blue can not be imparted to cotton fabrics save by the use of this substance, or animal albumen made from the white of eggs. Mixed with sugar, large quantities of gluten are manufactured into macaroni; and, mixed with other ingredients, as potatoes, it can be made of use as an article of food to much advantage.

From Starch to Sugar.—"In transforming the starch into sugar, it is first changed into dextrine, then into syrup, and then into sugar. Dextrine is the same as British gum, and is used for making mucilage, fixing dye-stuffs, and applied to all purposes to which gum arabic is applied.

"The starch, about the consistency of stiff clay, is shoveled from the settling tub into a

large boiler, which will hold many tons. A few inches of water is let in on the top, filling the boiler about two-thirds full, when sulphuric acid or oil of vitriol is added, and the lid closed and fastened. Entering the top of the boiler, and running down to within an inch or two of the bottom, is a steam pipe, which terminates in pipes branching off from the center to all points of the boiler, and only an inch from the bottom. These branching pipes are perforated with small holes, and, when the lid has been closed, steam is let on, and, forcing its way through these small apertures, in about five minutes penetrates and softens the whole mass above it. In a short time, the contents of the boiler resembles starch as used for laundry purposes, and soon after it is changed to a substance resembling mucilage. In a few minutes more the contents become as thin and transparent as water, which is an indication that the starch has become thoroughly dissolved. If some of it be now placed in a proof glass, and a little iodine added, it will assume a dark blue color.

"Continuing the boiling, the starch is turned into dextrine. When this change is perfect, iodine produces a purple or red color. If the boiling is still continued, the dextrine changes rapidly to syrup, and then to sugar. Iodine will not indicate, by producing different colors, the changes as they occur, and alcohol is therefore employed. If any considerable quantity of dextrine is present in the contents of the proof glass, a few drops of alcohol will cause a 'flock' to be precipitated to the bottom immediately. If only a small quantity of dextrine is present, as in syrup and molasses, alcohol simply renders the contents of the boiler slightly turbid. When the dextrine is all changed, the work is completed, and the introduction of alcohol will produce no change in color or transparency.

"The temperature of the contents of the kettle is raised to three hundred degrees, and over, Fahrenheit, and the boiling requires very close attention and care. If the contents are boiled after all the dextrine has been changed, the most injurious results will follow. The first is perhaps a more complete change to cane sugar, but with such a combination with the sulphuric acid as will baffle all attempts at separation, even with the strongest of chemicals; it will be dark in color, salty and acrid to the taste, and comparatively worthless. The next change is to acetic and formic acid, and humus. At this stage, by the presence of the acetic acid, the compound can be made into vinegar by

simply adding water, though not in large enough quantities to render it practicable for the manufacture of vinegar. The formic acid, which is a mere chemical curiosity, having the power to neutralize alkalies, but devoid of effect otherwise, and distinguishable by its peculiar odor, which resembles freshly-baked bread, will not act injuriously in transforming it into vinegar. If the boiling is continued still farther, the product is transformed into humus or mold. But boiling too long with the acid is not the only danger; there is great danger of raising the temperature too high. It is necessary to raise the temperature over three hundred degrees Fahrenheit; but, if it is raised three hundred and sixty-five degrees, the syrup becomes changed to an amorphous sugar, known as barley sugar, which it is impossible to crystallize. If raised to four hundred or four hundred and twenty degrees, caramel, or burnt sugar, is the result, which can be boiled down until thick enough to run into cakes, and then dried and pulverized into powder, but not crystallizing, it will settle back into lumps again, absorbing moisture enough from the air for that purpose.

"Presuming the temperature not to have been too high, or the boiling continued too long, the steam is shut off from the boiler as soon as the transparency of the contents, when tested with alcohol, show that the desired stage has been reached. The liquid, as soon as possible, is drawn into a cooling tub, or settler, where the acid is saturated by the addition of slaked lime, which must be used with much care, because, if the liquid is too hot, and a trifle more than necessary is used, the lime will impart to it a bitter taste. Chalk and marble dust, being, when pure, the carbonates of lime, are used for the same purpose. Immediately upon the introduction of the lime, the sulphuric acid combines with it, forming sulphate of lime, or gypsum, the natural form of plaster Paris, which is precipitated to the bottom. In forming this union, provided the carbonates are used, large quantities of carbonic acid are thrown off, causing an effervescence similar to a glass of champagne or Seidlitz powder; and, to prevent the liquor from being thrown from the tub, it must be filled only partially, and the carbonates of lime introduced in small quantities. When effervescence ceases, it is proof that the sulphuric acid has all been neutralized.

"The liquor is now allowed to settle from six to eighteen hours, when, as clear and transparent as water, and of a fine, sweet taste, but

containing so much water—from 85 to 90 per cent.—as to prevent crystalization, it is drawn off into a fresh tub.

"The sulphate of lime is easily soluble in sugar, and, in neutralizing the sulphuric acid, the liquid takes up more or less of this compound, which it still holds in solution. As its presence would render the syrup black, or nearly so, and also prevent perhaps twenty-five per cent. of the sugar from crystalizing, it must be removed. Mr. HIRSH claims, among other things, the use of carbonic acid gas, in connection with the phosphate of ammonia, or the hyperphosphate of lime, for this purpose. The carbonic acid gas is made by forcing a strong current of air over burning charcoal, the acid passing off through a pipe. This pipe, after passing through a trough of water, which cools the gas, terminates at the bottom of a vessel filled with water. The gas forced out from this pipe passes up through the water, and all ashes, soot, or dust of any kind contained in it, of course is left behind. The top of the vessel is closed, and a pipe leads from it to the bottom of the tub into which the syrup has now been drawn. From this pipe the gas passes up through the syrup, and off into the air, causing a slight effervescence. Every particle of lime encountered by the carbonic acid gas, in its passage through the syrup, is separated from the sugar and rendered insoluble, and of course settles to the bottom. Where phosphate of ammonia is used, the phosphoric acid unites with the lime, separating it from the sugar, and rendering it insoluble, in which condition it falls to the bottom; the ammonia set free by the withdrawal of the acid with which it was united passes off into the air. Where hyperphosphate of lime is employed, containing two parts of phosphoric acid to one of lime, the superfluous acid unites with the lime in the syrup, rendering it, and by its withdrawal, the hyperphosphate also, a neutral insoluble phosphate, which is also precipitated.

"The syrup, after having remained some hours undisturbed, is drawn into a vacuum pan for evaporation, for, even after having received the treatment already described, its crystalization does not follow as a matter of course, but depends to a great extent upon the treatment to which it is still to be subjected, and the care it receives in its later stages.

"The vacuum pan is used because it is necessary to bring the syrup to its proper consistency by quick evaporation, and at the same time not heat it to too high a temperature.

The vacuum pan is closed at the top, and provided either with a steam coil or steam pipes, running up and down, with a stop-cock near the bottom, by which the contents can be removed, or additional syrup pumped in. An air pump, to exhaust the steam and air, is also provided, together with a thermometer, and, in the more complete ones, a vapor condenser, by which all the sugar carried off by the steam is caught and returned. By the use of the vacuum pan, assuming it to work perfectly, of course, water can be made to boil at just one remove above the freezing point, thirty-two degrees Fahrenheit, whereas two hundred and twelve degrees is the boiling point in the open air. Eighty degrees is the usual boiling point of the syrup, when first put into the pan, although as it becomes thicker, it retains more heat, and of course attains a higher temperature, about one hundred and forty-five degrees being the lowest boiling point when of proper consistency for crystalization. The syrup is drawn into the vacuum pan until about two-thirds full. All apertures are closed, and the steam let into the pipes, applying, in fact, two hundred and twelve degrees of heat. The air pump exhausts the air, and at about eighty degrees, although not hot enough to burn the hand, the syrup commences to boil and give off steam, which is also removed by the air pump as fast as generated, and in this manner the syrup is boiled down quickly. When the syrup has been boiled part way down, more is pumped in, and the same operation continued many times until the pan is over two-thirds full of syrup of sufficient density to crystalize, when it is drawn off, and passed through a Dumont filterer, of which mention has already been made as a cylinder, some forty feet in length, filled with pulverized animal charcoal. The charcoal is first heated by the introduction of steam, to prevent the syrup from crystalizing while passing through it. From the filter the syrup passes over a coil of steam pipes, containing the waste steam from the vacuum pan, and consequently not heated to a very high temperature. This completes such little evaporation as may still be necessary, and the syrup is run into molds, or boxes, similar to cane syrup for crystalization, receiving after it the same treatment."

Maple Sugar.—The maple-sugar crop of the United States is reported at forty million pounds annually—no less than twenty thousand tons! Of this, Vermont produces

one-half. The hard maple yields the true cane sugar; when properly refined it resembles precisely the sugar yielded by the cane. In its brown, commercial condition, it holds the peculiar maple flavor which makes it one of the most delicious of confections. Crude maple sugar is never worth so much for family uses as good cane sugar; but the maple syrup is more highly esteemed than any similar extract.

In those regions where the rock maple flourishes, which includes a broad belt stretching from New England to the far West, from the sugar camps of Maine, beyond the natural sugar orchards of Wisconsin, maple sugaring is practiced. There is no branch of farming carried on with so little outlay for fixtures. Farms in Vermont will not average over \$40 in investment for all their sugar-making conveniences. Comparatively little improvement has been made in the maple-sugar business for two generations. The ax has given way to the auger; the old troughs for catching sap have been generally displaced by tin, or wooden buckets, and hemispherical cast-iron kettles by sheet-iron pans, for boiling, and the stone arch or straddle-pole, by a brick arch.

Drawing Sap.—The early spring is the sap season, when the ground freezes by night and thaws by day. Never box your trees with an ax to gather the sap, but use an auger on the sunny side. Never bore with a downward slant into the tree, for this will catch and retain water, and greatly promote decay. Bore upward, about two feet from the ground, and never more than an inch or an inch and a half deep—the *Cultivator* says but three-fourths of an inch. If the auger penetrates beyond the bark and sap-wood, the vitality of the tree is injured. Most of the sap courses near the bark.

There are various opinions about the size of bit to be used; but this depends somewhat on the size of the tree. The *Ohio Farmer* says: "an auger one and a fourth inches in size;" the *New England Farmer* says that "a half-inch bore is as good for sap as a larger one;" the *Country Gentleman* thinks "seven-eighths is large enough;" and SOLON ROBINSON says: "not over an inch." We believe a three-fourth inch auger is as large as should ever be used, if a tree bears two spouts.

Mr. ROBINSON gives the following excellent directions for making cheap spouts from an iron hoop, which may be from two to three inches wide: "Cut into lengths of two to four inches with a small cold-chisel, using the end

of a hard-wood block for an anvil. Now grind one end sharp before making them into troughs, which you can do almost as fast as you can count, as follows: Bore an inch hole through a hard log, and saw it asunder so as to leave half of the hole exposed; drive two nails upon its side for a gauge; lay the flat piece of iron over this hollow and a round bolt on it, and hit that with a stout hammer or an old ax. You need not go to the blacksmith's, and you can not make wooden spouts half so fast, and they will not last half so long." Tin spouts are somewhat used; and in many localities wooden spouts are still preferred to either. It is desirable to have the hole nearly closed, so that the flow of sap may not be checked by dryness of wood. When freshing over, an auger is used each time one-eighth of an inch larger than the one before it, and the incision made but a shaving deeper. The spile will not have to be removed to do this. It is also recommended that the holes be carefully plugged with short plugs when the season is over, that the bark may grow over the wound.

One spiggot to a tree is generally enough. Very nearly as much sap will run from one spout as from two, and the life of the tree will thus be preserved to benefit those who follow in our footsteps. Let us remember the maxim to leave the world as good as when we found it.

The buckets for collecting the sap are generally made of tin; wooden ones are still used by some persons. These are propped up to the mouth of the spout, or suspended from a spike or hook driven into the tree. The holes from which the sap runs should be cleaned out and slightly deepened several times during the season, for the purpose of clearing away the mold which collects in the taps, and keeping them open and clean.

Sugar Making.—Improvements have been made in the manner of evaporating the sap. Large sheet-iron evaporating pans are now used. Some of them are set up with brick and mortar, and protected from rain or snow by a shingle or boarded roof. Cross bars of iron are laid on the brick, and on these the pans rest. The latter are generally made of Russian iron, and are five or six inches in depth, and of sufficient size to suit the quantity of sap to be evaporated. Two pans, two feet wide by four long, set in a brick arch, one forward of the other, will be sufficient for a "bush" of three hundred trees, and will boil the sap to syrup in twelve hours. The rims of the pans should be turned over very strong wire, and handles for moving them at-

tached. When several pans are used, they should be set on the same frames, but not at the same height, and each should be as much as its own depth higher than the other, as by this means the sap can be drawn with faucets from the highest to the lowest. Never pour hot sugar into wooden vessels.

It is impossible to make good maple sugar unless the sap is boiled soon after it runs. If it be allowed to sour in the least, the iron vessel in which it is boiled will darken the color of the sugar, giving it a disagreeable taste, and making it very injurious to the health of those who use it.

When the sap is boiled down to a syrup, it should be strained through a flannel strainer, and then boiled again until it granulates. When an extra quality of sugar is desired, the syrup is sometimes clarified by using milk, saleratus, or the whites of eggs. Half a tea-cup of new milk to every pailful of syrup is the proportion found most effective. The syrup and milk should be boiled slowly together, and the scum which rises to the surface carefully removed. When the syrup becomes thick enough, it should be poured into tin molds, and when solid, the cakes should be turned upside down, to keep them from draining too much. They will soon become hard. When the tapping and boiling are going on, the bush should be fenced, to keep all kinds of stock from upsetting the buckets, or damaging the works in any way.

If sugar-makers would economize time and wood, by all means let them have a tight sugar-house over their furnace, for a cold gust of wind, blowing on the surface, will stop the boiling, as the vapor is thrown back into the syrup. Try it for a moment with a lid, then raise your lid and see the water dripping back. The faster the evaporation, the more and better the sugar.

JOHN BOGUE, received a patent for an evaporator, which he used two years. It is very simple, consisting of the usual boiling pan, a reservoir for sap, a conducting pipe, and a peculiar float which rests in the pan, and admits the sap from the reservoir only at the same rate as it is evaporated. By this arrangement a man can fill the reservoir, build a big fire, go home to bed, and in the morning find his sap all boiled down. Mr. BOGUE counts it better than a man at twenty dollars per month in sugar-time.

High flavor in maple sugar is produced and retained by making it from the purest sap and richest syrup, and in the cleanest buckets, and

boiling in stirring off till it breaks brittle on snow or cold iron, and packing the cakes in air-tight chests or boxes. The syrup should be sealed up while hot.

Yield of Trees.—Sap is concentrated about fifty times to make sugar. An average yield of the maple, is from three to five pounds per tree, each season, old trees yielding most. A New Hampshire farmer suggests the planting and culture of sugar-maple orchards, and tells of one remarkable tree on his farm that started from the root of a small tree which was cut down for fence about sixty-two years ago. It is now some two feet in diameter. Three times the sap of this tree has been made into sugar by itself. The first trial, when the tree was smaller than it now is, it gave twenty pounds of dry sugar; at another time twenty-five pounds, and at the last trial, twenty-seven pounds. The tree was tapped with nothing larger than a half-inch augur, and only in one place. It has afforded at least twenty pounds of sugar annually for the last twenty years. Large orchards sometimes average ten pounds to a tree; and forty pounds have been made in one season from a tree in Ohio.

Sorghum.—Sorghum is a name now generally applied to the varieties of Chinese and African sugar-cane, which have been introduced so largely to the United States within fifteen years. Under the name of Sorgo, these congenerous plants have been known from remote antiquity; it is the *Holcus saccharatus* of LINNÆUS. About 1850, a variety of this plant was brought to France from China, by Count DEMONTIGNY; and from there, after successful experiment, it was soon transplanted to America. Imphée was brought about the same time from Kaffir-land, in Africa, and still another distinct species, from Otaheite.

The new sugar-cane, being found well adapted to our climate and soil, North as well as South, made quite an agricultural sensation for some years, and in 1860, there were 6,698,181 gallons of sorghum molasses produced in this country, and in 1862, the product of the Western States was more than 15,000,000 gallons, as much as there was of cane-molasses in 1860. Extensive areas in different sections of the Northern States were planted, machinery was procured for crushing the cane and boiling down the juice; conventions of sorghum planters and sugar manufacturers were held, and newspapers devoted to the specialty of the new canes, were established. In the West, the in-

terest taken in the sorghum question has been especially great. In this section of our country the demand for molasses has always been large, and the farmers, observing in the new cane a means of supplying this demand by their individual labor, did not hesitate to plant largely.

In many parts of the West, wholesale dealers purchased no sugar-cane molasses whatever, during the continuance of the war. The new plant appeared to fulfill its promise. But the official report of the national statistician for 1867, says: "Sorghum has suffered a material decline for several years, which is continued, causing despondency to producers." And the national chemist's report said: "The attempt to separate and crystalize the cane sugar of sorghum on a large scale has been wholly unsuccessful, and as a sacchariferous plant it is only valuable for its molasses."

It must be admitted that sorghum has not, thus far, seemed to justify the extravagant hopes of the most sanguine; but it has proved itself a very useful plant, and doubtless will henceforth form one of the common crops in American culture.

In the rotation of soiling for cattle, sorghum already holds a high place, and even if sugar could not profitably be made from it, it will continue to be largely grown by farmers for its product of domestic syrup. The soil and geographical range of the Chinese sugar-cane corresponds nearly with that of Indian corn. It produces the best crop on dry uplands, but the most luxuriantly on rich bottoms of the moist loams. It endures cold much better than corn, and experiences no injury from Autumnal frosts. It will also withstand excessive drought. It takes five to ten gallons of juice to make a gallon of syrup.

The Chinese cane seems more closely related to broom corn than the African, and manifests a greater tendency to "crossing" and deterioration from contiguous crops of the broom; it is also very liable to be thrown down by the winds, and to the production of large, gummy joints, which exercise a detrimental influence on the production of either syrup or sugar. The plant, too, when thrown down by winds or rain, in its efforts to regain the upright position becomes so crooked as to give great trouble to the workmen employed in handling the stalks. The African variety, or *Imphee*, on the contrary, is much more vigorous in the stalk, and seldom falls before the wind; its joints are much smaller relatively to the size of the stalk, and its juices are more limpid and rich, gener-

ally showing about one degree richer in sugar, by the saccharometer, than the juice of the Chinese cane.

The Washington Sorghum convention said: "By accounts from all parts of the country, this plant is universally admitted to be a wholesome, nutritious, and economical food for animals; all parts of it are greedily devoured in a green or dry state by the horses, cattle, sheep, and swine, without injurious effects, the latter especially, fattening on it as well as upon corn."

Soil.—Select either a lime soil, or supply it with a moderate amount of lime. Lime neutralizes the acids in the canes. A sunny exposure is preferred. Sorghum likes a strong, warm, and rich soil, such as will generally ripen common corn early, free from foul seeds, and one which will stand wet seasons well. A sandy soil is preferred, but it should be rich; a clover lay is capital. This cane is much more likely to suffer from wet Springs than from dry Summers, and hence the above preference for a loose and porous soil. The ground can not be plowed too deep, as its roots penetrate to a great depth, even as far as three and a half feet.

Planting.—As soon as the ground is sufficiently warm and dry in the Spring put in the seed, from one-fourth to one-half an inch in depth, drilling it in rows about three and a half feet apart, and secure a good stand of cane every twenty inches. Many think time is gained by sprouting the seed, which may be done by pouring hot water upon the seed in a basket, and allowing it to stand by the stove a few hours. The object of "sprouting" is to crack the hull, and care must be taken not to let the sprout shoot forth too far before planting, as it is easily broken off, and the seed lost.

Cultivation.—The young cane plant is exceedingly diminutive, and is hardly distinguishable from the fox-tail or Summer grass; hence the importance of having clean ground. Stir the ground freely from the time you can see the cane until it is about three feet high. Let no weeds be tolerated. In some soils the cane is liable to "tiller," or, as it is sometimes called, "sucker." It will, therefore, be advisable to remove the young suckers, in order to permit the main plants to mature uniformly and vigorously, and also to facilitate the stripping and gathering. Where the suckers are permitted to grow up they detract greatly from the strength of the main plant, and impede the workmen in gathering the crop, as they are often in doubt as to

which to select and cut; besides, if gathered along with the main stalks, and sent to the mill, they impart to the syrup a wild grassy flavor, together with an excess of acid, which is difficult to remove, and which proves a positive barrier to the manufacture of sugar. It is well to know that this cane will bear transplanting. In this way missing hills may be supplied, or early crops grown, by starting in hot beds, and transplanting in May or June.

Harvesting.—"Just previous to cutting," says ISAAC A. HEDGES, in the United States Agricultural Report for 1861, "the leaves should be stripped off by hand, if desired for fodder, or, if they are designed to be left on the ground, by a smart stroke of a stick about four feet long. The seed heads, together with about four feet of the cane, should be cut off and tied into small bundles with the leaves; they are far better as food for every kind of stock than sheaf-oats, and are richly worth saving. I am aware of a rumor which has gone abroad to the effect that they are injurious; and, although the statement has a thousand times been refuted, I am still asked whether the seed will not kill cattle and horses. I once lost a valuable horse by feeding to him imprudently a mess of oats, and so, but *only so*, it may be with this seed.

"The dismantled canes should then be cut off near to the ground, and tied in bundles of twenty or thirty stalks, with the wilted leaves. Each bundle should be tied in two places, which will greatly facilitate the subsequent handling. In this condition the cane may be set up in ricks in the open air, or, preferably, under shelter, and kept for some weeks. Such keeping improves the juice not only in flavor, but also in saccharine richness, from one to three degrees. This improvement takes place upon the same principle and from similar causes which determine the sweetening of acid fruit after pulling, viz., the change of the gum and starch into sugar. If, at any time while the cane is standing, a sharp freeze should occur, the whole crop should be slashed down and thrown into windrows, with the tops uppermost. If much difficulty should then arise in stripping off the leaves, the canes may be ground with the leaves adhering, but the tops should be freely cut off. All possible despatch should be used after freezing in getting the canes through the mill, lest a warm sun should come out, and fermentation and souring commence." In securing this culmination of the juice and preventing re-acidulation lies one of

the great fundamental means of success in the manufacture of sugar from any variety of cane, being rather difficult of attainment, more particularly in the African cane, owing to the disposition in the canes not to mature at the same time.

Manufacturing into Sugar.—Whatever may be the answer to the question raised by the chemist before referred to, whether the syrup can profitably be crystalized "on a large scale," there is no doubt that sugar is being made from it on a moderate scale, for home consumption, to great advantage. D. M. COOK, of Mansfield, Ohio, thus describes the method:

"Having secured the cane at its best stage, the next question is the best mode of manufacturing. An iron mill, with at least three rollers, should be used, as the wooden mills (which answered well for our primitive experiments) lose one-half of their juice. The cane should be stripped, topped, and, for *very nice* experiments, should be cut in the middle, the butts pressed and evaporated by themselves for sugar, and the tops for syrup. In my experiments in 1861 I used the whole stalk with complete success."

"Of the most vital importance is the mode of defecation and evaporation. To boil the juice in the ordinary kettles or pans is to waste both your time and your crop, as has been fully demonstrated by the thousands of experiments heretofore made. Defecation and evaporation must be combined in one action; that is, during evaporation there must be a constant defecation. The albuminous matter will not coagulate except upon the application of an active heat, and, as this matter, and other impurities rising in the scum, can not rest upon a boiling surface without being again plunged by the currents into the juice, and, finally, so incorporated with the syrup as to prevent granulation, it is clear that the evaporator must afford a means of retiring this scum from the boiling surface as rapidly as it arises. Hence there must be a cool surface within the pan, outside the line of ebullition, where it may rest. This cooling surface is indispensable, and no one has succeeded in making sorgho sugar who did not use it. I therefore made a pan with the sides projecting over the surface several inches.

"In my first experiments I used lime in defecation, but finding that a simple *active heat* was the best defecator, I abandoned it. To secure the best effect in defecating by heat, and also the most rapid evaporation possible, which is another great requisite to success, the juice

should be boiled in shallow bodies. In doing so I found great danger of burning, and, therefore, introduced a running stream of juice into my pan; but, as the scum collecting at the cool sides of my pan would pass down the whole length of it and mingle with the syrup as it flowed out into my coolers, I constructed ledges starting out from each side alternately, and reaching nearly across the pan, thus giving me a zigzag current from one end to the other. These ledges held the scum at the cool sides until removed by the skimmer. They also accomplished another important and very unexpected result, which I will endeavor to explain:

"Different degrees of heat cause different kinds of impurities to rise to the surface. At the front end of my pan one kind came up, while further down, being hotter, another kind, and so on, until about half way down my pan I found all the green impurities removed, and nothing left but the "cane gum," as it is frequently termed; this is precipitated, and forms a white coat upon the pan for the space of about three or four channels. This coat must be removed from the pan, while soft, with a stiff broom, as it becomes almost as hard as steel, and is then difficult to remove. After this "gum" is removed the syrup is free to crystallize, and to this principally I attribute my success.

"Another thing I found essential. The syrup must be hurried to the point of crystallization as rapidly as possible, and, when it is attained, be instantly removed from the evaporator. That point is about two hundred and twenty-eight degrees Fahrenheit, and testing the syrup by weight it should weigh from eleven to twelve pounds to the gallon. Eleven pounds does very well, but crystallization is rather slow. The bubbles afford a good index of the proper stage, the same signs used in boiling maple being applicable to sorghum.

"In order to cause my running stream always to reach the outlet of the pan just at the point of crystallization, I placed it upon rockers, and could thus hasten or retard the stream as my fire might require. I am thus enabled to have a constant stream of juice flowing into the pan, and a stream of syrup as constantly from it. This device secured for me the grand requisites, thorough defecation and rapid evaporation. A patent for it has been granted me.

"It has been a question what kind of metal should be used in evaporators. Galvanized iron has been very extensively used through the West, and is highly valued by many. The

objection to it is, the galvanized coating is liable to scale off. It is also affected by the acids in the juice, so that syrups made upon it have a saltish taste. Russia iron is highly esteemed, and, for a cheap article, is, perhaps, as good material as can be used, but the best yet tried is good heavy sheet copper. True, this is expensive; but this is more than balanced by its durability and the ease with which it is cleansed.

"If any object to the use of sheet metal on account of its lightness, I would say that it is more durable and economical than cast iron. The latter often *cracks* just at the time you can least afford to stop your work. It also rusts out very rapidly—more so than Russia—and galvanized iron is cumbersome, difficult to handle, and, moreover, is very expensive.

"In addition to a mill and an evaporator, which will accomplish the above results, there are needed several shallow wooden coolers and a V-shaped draining box with slide-covered openings in the bottom. The mill may be set upon a bank and a pipe lead from it to the evaporator below.

"The syrup should not be raised above two hundred and twenty-eight or two hundred and thirty degrees Fahrenheit. If made too thick, the atoms of sugar are not free to move about and assume the crystalline form. Neither should the syrup be allowed to get cold. The coolers should be set away in a warm room, at a temperature of about ninety degrees, and that temperature should be maintained day and night until crystallization is perfected. In our climate artificial heat is, of course, required, and *our farmers can not expect success unless they are willing to go to this trouble*. My syrup crystallized in twenty-four hours, and in a very few days crystallization and drainage was complete."

Mr. HEDGES, in the article before quoted from, says: "Two main objects should be borne in mind in the construction and placing of pans, or evaporators, viz.: to use up all the heat of the furnace, and to give full employment to the attendant. I made one pan, for experiment, twelve feet in length and three feet in width, thus exposing a superficies of thirty square feet to the fire; yet I found that the flame from the furnace passed ten feet beyond the pan, and then entering the flue of a steam boiler twenty-six feet long, soon raised steam therein, and in its mate, to four pounds pressure. In this pan I could make fifty-four gallons of syrup in six hours by burning a half cord

of inferior wood; now, had my pan been constructed of a length of twenty-five or thirty feet, I should have been enabled, with the same fuel, to make from seventy-five to one hundred gallons of syrup in the same time. The furnace in the above case was twenty-four inches in vertical height, and deep enough from front to back to receive four-foot wood; larger furnaces, with large doors and corresponding capacious ash-pits, good gratings, and so forth, will be found still more economical. The inside of the furnace and flue should be constructed of fire-bricks, and be well supported by outside work, anchored together, and made firm; the door frames should be secured to the brick work by iron anchors."

In an able paper on Sorghum Culture, in the United States Agricultural Report for 1865, by WILLIAM CLOUGH, editor of *The Sorgo Journal*, we find the following:

"The production of sugar from sorghum has been much retarded by a false notion on the part of many that it is to be accomplished by some sovereign specific, which is to make the syrup crystalize. This has led producers away after pretentious patent processes, to the neglect of a careful attention to every step in the operation, which is the only certain means of success, and without which nothing else is of any avail. It should be understood that syrup frequently contains no crystalizable sugar whatever, and to produce a single grain of true sugar from such syrup transcends all arts of man's device. Carbon has been made to crystalize and afford artificial diamonds, but no man has ever yet succeeded in making a grain of artificial cane sugar. It is developed alone in the great laboratory of nature, and all that art or science can do is to preserve it unimpaired, and separate it from excess of water and the impurities which obstruct granulation. It will then crystalize, when reduced to the proper temperature, without the employment of any 'process' or extraneous aids whatever. Syrup often contains so small a portion of crystalizable sugar—that is, the minute atoms of sugar are so far separated, that they are not attracted to each other; in which case crystallization can not occur. Sorghum syrup generally contains a dense, viscid substance which obstructs granulation. This can be removed; but the only effectual means of removing it is by filtering it through a liberal quantity of freshly burned bone coal—a means which can not be considered practicable with the mass of the farmers. But it can be, in a great

measure, avoided or prevented from occurring; and this, together with the means to be employed for promoting the development of cane sugar in the plant, and preserving it unimpaired, constitutes the whole art of 'making sugar from sorghum.' It all consists in strict compliance with the conditions imposed at each step in the operation, from the selection of the seed to the final act of purging or draining the crystalized product. It is not to be accomplished by any magical or sleight-of-hand process. There is absolutely no 'royal road' to sugar."

Mr. HEDGES concludes his essay as follows: *Hybridization*.—"Great care should be taken in the selection of seed. Our sorghum has been grown indiscriminately with broom corn and other members of the millet family, that it has become to a great extent hybridized. Know the history of your seed before you plant it.

"*The Sorghum taste* will not be found in well-grained sugar, as it all drains out with the molasses. The sugar is of fine flavor, surpassing the New Orleans and nearly equal to maple. In the syrup the 'sorghum taste' may be removed by treating the juice with milk of lime or whitewash before boiling. The proper quantity may be known by testing with litmus paper. With too little lime the blue litmus is changed to a red, and with too much that red is changed back again.

Value of the Crop.—"The expense of cultivating and manufacturing an acre of sorghum is about \$37. It may run, possibly, to \$45 or \$50. My cane yielded about two hundred and twenty-five gallons to the acre, and of this about seven pounds to the gallon were crystalizable sugar, giving one thousand five hundred and seventy-five pounds to the acre.

"Mr. J. H. SMITH, of Quincy, Illinois, made one thousand five hundred pounds to the acre from the crop of 1861, and had one hundred and fifteen gallons of good syrup beside. Brown sugar is now retailing throughout the West at 12½ cents, and wholesale at 10 cents per pound. Molasses sells readily at wholesale at 40 cents. The profits may therefore be stated as follows:

1,500 pounds of sugar, 10 cents per pound.....	\$150 00
115 gallons molasses, 40 cents per gallon.....	46 00
	\$196 00
Deduct expenses, say.....	50 00
Balance, net profit.....	\$146 00

"I look upon the day as near at hand when the North will raise sugar for export. All that is wanted is for the farmers to give the sorgo crop the same care and attention they would

any other. So long, however, as they are satisfied to make syrups in the most negligent manner, and in common pans and kettles, and so long as they take less care of it after it is made than they would of vinegar, they must be content with miserable wild-tasting sorghum molasses, leaving the *sugar* for their more enterprising neighbors."

D. J. POWERS, of Chicago, thus writes: "I know from actual experience, that an acre of sorghum can be raised, and got ready for the mill as easily as an acre of corn, and an average crop will yield one hundred and sixty gallons of *good, thick, clean syrup*, worth at wholesale, in any Western market, at least fifty cents per gallon, and seventy-five cents at retail, making the net product, when manufactured on equal terms, \$40 per acre. Now, an average crop of corn would yield from thirty to thirty-five bushels to the acre, which at the ordinary price of twenty-three to twenty-five cents per bushel, would be just about one-third of the net amount of the acre of sorghum, saying nothing about the cane-seed, which, when mature, is worth nearly, or quite one-half as much as corn."

Method of Planting.—A Connecticut sorghum grower made an interesting experiment in growing cane in 1864. He planted nine rows with the hills four feet apart each way, and nine other rows nine feet apart and the hills two feet asunder in the row—thus giving a less number of hills by the latter than the former planting; and yet he got fifteen gallons of molasses from the former, and forty gallons from the latter; and, in addition, he raised a row of potatoes between the rows in the latter case. The sorghum needs light, and hence the great gain in the wide rows.

Tea.—Tea can scarcely be regarded as a "field crop" in this country, but it grows readily in our Southern States, and an effort has been made to introduce its culture on a large scale. That tea can be grown successfully in Carolina, Georgia, and Florida, is certain, because the experiment has been fairly tried. The thermometer at Shanghai indicates a cold more severe by thirteen degrees than in Charleston. As early as 1851, JUNIUS SMITH raised the tea plant in South Carolina; and called public attention to the fact that, at the Chinese average of five hundred pounds per acre, it would require the cultivation of only 20,000 acres to supply the United States. "In 1860, W. JONES, of Liberty county, Georgia, set out fifty plants,

and has supplied his family from them ever since." The tea plant is an evergreen shrub, leaves from three to four inches long, one inch width; flowers white, one inch or more in diameter; center filled with large number of stamens, with yellow anthers; capsule usually three seeded; seeds the size of a chinquapin, abundant; blooms in October and November; it seeds the next September; grows from cuttings or layers.

In 1866, Mr. JONES' plants were six to seven feet high, and as great in diameter across, the branches interlocking. The vigorous growth of leaves takes place in April. As soon as they appear, they are plucked, gathered in a basket, and spread on tables in the sun for one day. They are then rolled together in little moist balls; dried again; then rolled again in very small parcels. The curing is finished by putting them in heated pans, warm enough to admit of stirring them rapidly with the fingers. This should be continued about five minutes, or until they are perfectly dry. The plants produce good crops for eighteen or twenty years. The growth of tea is not affected by dry or wet weather, or by storms, and insects will not molest the plants.

Capt. JAMES CAMPBELL, near Knoxville, Tennessee, obtained a few Hyson Tea plants from the Agricultural Department in 1858, and they have attained a height of five to eight feet, and furnished small quantities of tea. All the different varieties of green and black tea are obtained from one kind of plant; the difference resulting from time of picking and manner of curing.

The chief obstacle to tea-raising in America seems to be the expense of curing it. "A journal said recently: "The culture of tea in South Carolina has proved a failure. It grows well enough, but wages are too high in this country. It is profitable in China, but a fellow is hired there for a dollar a month, and boards himself."

Tobacco.—America is responsible for tobacco. "Some sailors having been sent ashore in Cuba by Columbus, were surprised to see the natives of the island puffing smoke from their mouths and nostrils. They afterward learned that this was the smoke of the dried leaves of tobacco." Its botanical name is *Nicotiana*, from JEAN NICOT, who carried it from Central America to Spain in 1560. Its specific name, tobacco, is supposed to be derived from Tobago, a West Indian Island; or from Tabaco, a province of Yucatan; or, as HUMBOLDT insists, from *tobacum*, the pipe in which the Hay-

tiens smoke it. It was carried from Virginia to England in 1586, by RALPH LANE, and Sir WALTER RALEIGH was the first on the island to smoke it. Smoking soon became fashionable in street and palace, but it called from the fastidious monarch, JAMES I, the famous "Counterblast." "It is," said he in his tract, "a custom loathsome to the Eye, hateful to the Nose, harmful to the Brain, dangerous to the Lungs, and in the black, stinking fumes thereof, nearest resemble the horrible Stygian smoke of the pit that is bottomless!"

Tobacco has had its martyrs. ABBAS I, seventh Shah of Persia, had the lips cut off those who smoked, and the noses off those who took snuff. MICHEL FREDEROWITZ, Czar of Russia, executed without trial his subjects who were guilty of its use in any form. MAHOMET IV had a hole bored in the noses of his culprits, and a pipe introduced across the face. The Parliament of Paris proscribed tobacco. URBAN VII and URBAN VIII excommunicated those who gratified a taste for the "filthy vegetable." Queen ELIZABETH, of Spain, authorized the confiscation of all snuff-boxes for the benefit of the church; but RICHELIEU did better than that—he taxed them. Indeed, tobacco seems always to have borne heavy burdens in Europe. The English have sometimes paid eight hundred to a thousand per cent. for it, and the present British duty on tobacco is seventy-two cents a pound. In France it has yielded to the throne an annual revenue of fifteen million dollars, and in Holland, of more than twenty million dollars.

The *St. Louis Gazette* goes into a calculation to show the amount of tobacco a man chews in a life-time. The editor says: "Suppose a tobacco chewer is addicted to the habit of chewing, fifty years of his life; each day of that time he consumes two inches of solid plug, which amounts to six thousand three hundred and seventy-five feet, making nearly one and one-fourth miles in length of solid tobacco, half an inch thick and two inches broad!" He inquires what a young beginner would think if he had the whole amount stretched out before him, and he was told that to chew it up would be one of the exercises of his life, and also that it would tax his income to the amount of one thousand and sixty-five dollars.

Another GRADGRIND shows that indulgence in the habit causes the waste of an incredible amount of valuable time. But man is willful and weak, governed more by appetite than arithmetic; and the tobacco fields are still

green, and presses are doggedly at work, and meerschauts are hopefully coloring, as we go to press.

In fact, the culture seems to be increasing. The tobacco raised in the United States in 1850, was 199,752,655 pounds; and in 1860, it was 434,209,461 pounds, an increase of nearly 220 per cent.! Of this crop, Virginia and Kentucky produced more than half. Next came, in order, Tennessee, Maryland, North Carolina, Ohio, and Missouri. Connecticut produced more than New York, and double the quantity raised by all the rest of New England. The war reduced the tobacco crop one-fourth, which loss had not been recovered in 1868.

The principal variety grown in the Northern States is the Connecticut seed-leaf. It is ordinarily used for cigar wrappers, and the larger and the more perfect the leaf, the more profitable is the crop. For smoking or chewing, it is an inferior variety. In fact, it seems very difficult to grow a good quality of chewing tobacco in the Northern States. It is found much more profitable to grow a large, tough leaf, suitable for cigar wrappers, than to attempt to grow a smaller crop of choicer variety.

Soil.—A warm, sheltered location, deep, rich, sandy loam, free from weeds or grass, is the best. Plow or spade, in the Fall, ten to twelve inches deep; make level by harrow or rake, and cover closely with tobacco stalks laid on straight. In Spring, as soon as the ground will work well, remove the stalks and plow three or four inches deep, making a very narrow furrow slice, and into each furrow, as turned, strew guano or hen manure quite freely; work in on the surface three pecks to a bushels of poudrette or well-pulverized compost, to the square rod, and make the soil as fine, and the surface as smooth and level as possible. Use a tablespoonful of seed to each square rod of bed; mix it with sand, and sow broadcast very evenly; finish by rolling with a heavy roll. Make the beds ten to twelve feet wide, that being a convenient width in working; cover with brush to keep fowls off, and to prevent radiation. To weed the bed, remove the brush and stretch a plank across the bed, using blocks under the ends to prevent the middle from setting on to the plants when you sit on it to weed. The bed should be kept carefully clean of all weeds.

W. W. BOWIE, writing for the latitude of Baltimore, says the soil should be well pulverized with two or three thorough diggings. "After the first digging sow Peruvian guano, at the rate of four hundred pounds per acre, and work

it in. For every one hundred square yards mix one gill of seed with half a gallon of plaster or sifted ashes, and sow evenly, in the same manner as gardeners sow small seeds, only with a heavier hand; roll with a hand-roller, or tread down the bed with the feet. If the seed be sown before the middle of March the bed should be covered with bushes, free from leaves, unless they be pine brush, which is the best covering. Sow any time during Winter when the land is in order. The best time is from the 10th to the 20th of March, although it is safest to sow at intervals, whenever the land is in fine working order."

Manures.—Tobacco is one of the most exhausting of crops. This paltry weed requires more mineral manures (salts) to supply itself, than any other grown. The proportion abstracted is enormous, and shows conclusively, the necessity of constant and heavy manuring with *special manures*, to sustain the highest fertility of the land. By special manures, we mean such as are designed by their composition, to supply the appropriate food of plants, in the requisite proportions.

We have, for instance, in eight hundred pounds of tobacco leaves taken from a field, one hundred and sixty pounds of mineral ingredients (ash), of which the soil is absolutely robbed, and which it has no means of again acquiring, but by direct application. This amounts to twenty per cent., or one-fifth of the entire crop, and is composed, according to the analysis of Professor JOHNSTON, of

Potash.....	12.14
Soda.....	0.97
Lime.....	45.20
Magnesia.....	13.09
Chloride of sodium.....	2.49
Chloride of potassium.....	3.58
Phosphate of iron.....	5.45
Phosphate of lime.....	1.49
Sulphate of lime.....	6.33
Silica.....	8.01
	169.00

To supply these materials, ordinary farm-yard manure is insufficient; so, too, is lime, or plaster, or salt, or any one article. It needs a combination of several, which are in a great measure to be found in ashes, combined with the ordinary manure of the farm-yard. But if an application of special manures is sought, they will be appropriately found in the following proportions of the subjoined materials:

Bone dust, sulphuric acid.....	23 lbs.
Carbonate of potash, (dry).....	31 "
" " soda, (dry).....	5 "
" " magnesia.....	25 "
" " lime, (chalk).....	60 "
	144 lbs.

If the farm-yard must be the main reliance,

there should be twenty to twenty-five cords per acre, well fined, spread broadcast after the second plowing, and harrowed so as thoroughly to incorporate it with the soil—this with four hundred pounds of mixed guano and plaster will do the work. Ashes is an admirable fertilizer for tobacco land.

Transplanting.—It is essential to get the plants set as early as possible; from the 1st to the 15th of June is best. A moist or wet time is desirable for transplanting, but by watering the ground and the plants after setting, it may be successfully done, even in a dry time, if done thoroughly. Good-sized strong plants grow more readily than weaker ones. One who can set cabbage or lettuce plants, can set tobacco, using care in pressing the soil up to the roots, and not pinching or covering the buds; set them as near as they stood in the bed, leaving the soil a little dishing around them.

Cultivation.—As soon as the plants take root begin to use the cultivator and hoe. Stir the ground slightly close to the plant at first; afterward more thoroughly; let the cultivation be repeated as often as once in ten days, till the tobacco gets too large to go with the cultivator and horse; keep the weeds down with the hoe, and stir the soil as much as possible without injury to the plants.

Topping.—To throw the growth of the plant into that portion of the leaves which will give the best returns in profits, etc., the plants need topping when the blossom is fairly formed; just where, is a point demanding good judgment, and what is of importance, experience. The nearest we can come at it on paper is to say, top where the leaves are about six inches wide when the plant has run up to blossom, leaving the plant about two and one-half feet high.

Suckering.—This consists in breaking off the shoots which start from the stalk at the axils of the leaves; these should be kept broken off as fast as they make their appearance; the last suckering to be done immediately before cutting.

Harvesting.—Tobacco should be cut as soon as ripe, which is known by a spotted appearance of the leaves; they also assume a harsh and brittle appearance and are easily broken when folded. A hay knife or backed saw is the best to cut with; lean the plant a little and cut underneath the leaves close to the ground; lay in regular rows to wilt so that it may be handled without breaking; then haul to the barn on a platform wagon. It should be looked

to not to let it sunburn; five minutes in a clear

hot sun will sometimes injure it irreparably. Turn and cart it under cover or shade when in danger.

Curing Barn.—A separate building, arranged expressly for the purpose, is the best; but stables and sheds can be used for want of better. A building thirty by thirty-two, with fifteen foot posts, will hang an acre of good tobacco, by hanging three full tier and a part tier on the purlin beams. A basement room under a part, or all of the building is convenient for stripping, packing, etc. One-half of the siding should be hung on hinges, and there should be a ventilator in the roof to admit of free ventilation, etc. The girts should be arranged equidistant, for resting the poles for hanging on. For poles get straight poles, five or six inches in diameter, or sawed scantling, two by five; these are arranged ten inches apart when filled with plants.

Curting and Housing.—A platform wagon is best to cart on; lay the plants on crossways, but uniformly one way. To save handling, two teams or wagons are necessary, with sufficient help to hand it from the load to the one who hangs. These directions are from WILLIAM H. WHITE, of Connecticut: "Twining on poles is the most expeditious; other ways are pegging, spearing, and hanging on laths; procure sawed or rived laths from straight-grained timber; taper them at one end to fit an iron socket which is pointed at the other end; the socket end is made to fit a lath one-half by one and one-fourth inches. The laths are four feet long; scantling are arranged in the building four feet apart from centers for the lath to rest on after being filled. A one and one-half inch hole, bored a little slanting, three and one-half feet from the foot of a barn post, will serve to hold the lath while being filled. Commence by tying your twine to a plant, and place it by the side of the pole; on the opposite side, about six inches along, place the next, and secure it by a single turn of the twine from left to right, thus placing them alternately till the pole is filled, when the twine is secured. Good strong hemp twine is used." The above method is that most practiced in Connecticut. Mr. BOWIE, in the article before referred to, gives the following: "There are various modes of securing it in the house—by pegging, splitting, tying with twine, and spearing, the latter now being considered the best and most expeditious method. Tobacco sticks are small, round, and straight, four and one-half to five and one-half feet long. They may be rived out like

lath, or narrow paling, one to one and one-half inches square, smaller at one end than the other. One end is sharpened to admit the spear. The spear is round, or like the Indian dart in form. It is made of iron or steel, bright and sharp. These sticks are carried to the field, and dropped, one at each heap of newly cut tobacco. The spearing is done by punching one end of the stick into the soft ground, the spear being on the other end, and with both hands running the plant over the spear, and down the stick, thus stringing the eight or ten plants in the heap on the stick."

The tobacco all hung, give it all the ventilation possible in fair weather, without allowing the sun to shine on it directly; rainy or foggy weather, close it in. The sweat, or pole burn, happens in about two weeks after hanging, if the weather be sultry and damp. Clear, drying weather, or tight buildings are desirable at this time as a prevention.

Stripping.—When the sap is all dried out of the leaf-stem, the tobacco is cured; and when a mild damp time comes, open the barn that it may dampen; when it can be handled without rustling, take it down, carry it to the basement and bulk it free from the ground, butts out, tips lapping about one-third. No more should be bulked than can be stripped out in three or four days, or it may hurt. It is assorted into two or three sorts, according as it is more or less perfect; each sort is kept separate, and done up in hanks of about three to the pound; the butts of the leaves are kept even, and bound neatly with a leaf wound around and tucked into the hank; neatness in this part often adds several cents per pound to the value. The tobacco, after being stripped, should be bulked soon, to keep from drying out.

Casing.—Most of our large successful growers case their own tobacco, after leaving it a short time in bulk; a mild time is chosen, when it is pressed into boxes two feet four inches square, by two and a-half feet long, inside measure; three hundred and seventy-five pounds are pressed in each case, with a lever or screw for the purpose. The hanks are laid in, butts to the end of the box, away one inch, to prevent crowding against the end; the leaves are straightened out smooth, to keep from pressing in wrinkles. The following season the tobacco undergoes a fermentation, or sweat, which makes it tobacco, ready for manufacture.

We recapitulate several points upon which experienced growers strongly insist, because

they express conditions of success in cultivating tobacco.

1. The land must be in good condition—well enriched with manure. It must be plowed in the Fall, and again in the Spring, and thoroughly pulverized.

2. The plants in the seed-bed must be thoroughly weeded and guarded against the fly, and so thinned out as to acquire a hardy growth before being transplanted.

3. During the season for the ravages of the worm the plants must be examined twice each day for the purpose of destroying them.

4. In curing, the leaf-stalk must be perfectly free from moisture.

5. We add: farmers who are commencing the culture of tobacco should avail themselves of the services of an experienced man who can supply that knowledge which can not be learned from books.

Profit as a Crop.—Tobacco is one of the most profitable crops grown. Cultivators in the States of Maryland, Kentucky, and Ohio, report as an average, under the system of cultivation practiced, and without much manuring in the latter States, from one to two thousand pounds per acre, according to quality of soil and variety of tobacco, sold at from ten to fifteen cents a pound. In Connecticut the tobacco for years yielded a net profit of \$200 to \$400 an acre. It requires considerable expense to begin with, but after the preparations are made, it will, with proper care, realize at least \$100 an acre. One farmer in Massachusetts raised two thousand four hundred pounds to the acre, and sold it at forty cents a pound.

Turnips.—The turnip is far less nutritious than other edible roots; but its adaptability to soils, its acceptableness to stock of all kinds, and the fact that it can be raised later in the season than almost any other vegetable, gives it a prominent place among farm crops. CUTHBERT JOHNSON, says: "No other vegetable has had such influence in advancing the husbandry of Great Britain as the turnip. Not only does it enable the farmer to supply the consumer with fresh meat during the Winter, instead of the salted food upon which our ancestors had almost exclusively to depend, but also partially supplies the place of a fallow; it imparts to the land a degree of fertility which ensures, under proper management, a succession of crops for the following years of the rotation. It is indeed the sheet-anchor of light soil cultivation, and the basis of the alternate

system of husbandry, to which every class of the community is so much indebted."

The turnip has been known in Great Britain for three hundred years, as narrated in its agricultural history, and its connection with civilization is, doubtless, much more remote. Culture has brought it to its present perfection. One of the most distinguished men of England has declared that the failure of the turnip crop of the realm would be a greater calamity than the failure of the Bank of England.

Scarcely any other crop can be raised with so little expense and trouble as turnips, and no other plant will produce so great a quantity of food when sown after the first of July. An advantage in turnip culture arises from the fact that the crop may follow wheat, rye, barley, or other crops taken from the land; it may also be grown in connection with corn, tobacco, etc., and be used to fill out wherever these or other crops fail.

The ruta бага is raised with greater ease than the mangels, in fact, the chief value of the turnip as a field crop, consists in its accommodation to late planting, and its yielding good returns on comparatively poor soil.

For Feeding.—As will be seen by a table, previously given, even the Swedish, or ruta бага, the best of the turnip tribe, is far inferior in value to the mangel wurzels, and other roots, while the white turnip is the least nutritive of all edible roots, being more than nine-tenths water. Yet cattle may be rapidly fattened on Swedish turnips and good hay alone, making rich, juicy meat, and when fed for a few of the last weeks, before slaughter, on corn meal, the meat is equal to, if not preferable, to that fed entirely on corn.

Ruta bagas are valuable as food for stock, chiefly as an appetizer rather than for their nutritive properties; and for this purpose, they are much more important than their analysis would indicate. Stock will be healthier in the Spring when they have had a regular ration of turnips during the winter, than when confined to hay and grain altogether. It is against nature to be fed on succulent food for six months of the year, and the next six wholly on dry feed. The ruta бага is the only root that increases in nutritious qualities as it increases in size.

Soil.—Turnips will grow and make a fair crop in almost any soil, if it be mellow, in good heart, and free from standing water; the deeper the soil the better, as with all other root crops. The soil best adapted to the crop

is the deep, black, moist soil of the bottom lands, whether in timber, openings, or prairie. While the ruta бага grows almost entirely above ground, there is nothing which delights more in a deep, mellow bed. The cleaner from weeds and grass the better for the crop. A light, sandy or gravelly loam, in good heart, produces the best flavored turnips for the table.

Manures.—Superphosphate of lime is a specific for turnips, and on any tolerably good soil, five hundred pounds will insure a fine crop. Lime, ashes, plaster, guano, bone dust, are each excellent in moderate quantities, harrowed in before sowing, or scattered broadcast when the crop is hoed. On sward land it is best to turn under some fresh manure to insure fermentation and quicker rotting of the sod.

Varieties.—There are three classes of turnips, viz., *Swedes* or *Ruta Baga*, *Yellow*, and *White*. The *white* or common turnips are sown last, but used first, followed by the *yellow*, and lastly the *Swede*, which is the kind generally grown to store for Winter use. There are several varieties of *Swedes*—SKIRVING's improved purple top being most generally sown. LAING's purple top is also a good kind—does not grow so large as SKIRVING's, but is of a better quality; top very small. Some farmers sow the common red top or white stone for first consumption; Scotch yellow for second, and ruta bagas to consume last. But in sowing, this order wants reversing; ruta bagas may be sown from June 1st to July 1st, the others may go in later.

Sowing.—There are three ways: 1, broadcast; 2, on the flat, in rows 18 to 22 inches apart; 3, on ridges 26 inches apart. Each plan has its advocates, though drill sowing is gaining ground. WILLIAM ANDERSON, of Rockford, Illinois, in a prize essay on the turnip, says: "In putting the turnip-seed in ridges, I have generally used a drill covering three ridges, either with or without artificial manure. To do this properly, of course the ridges must be made true and straight; otherwise the drill would not keep the center of the ridge, and they would be difficult to cultivate, and it is quite as easy for a good plowman to make a ridge straight as crooked—in fact rather more so. With a drill taking only two ridges, having concave rollers and those made to vary according to the width of the ridge, there is not the necessity for such particular work. I have occasionally used a drill taking only one ridge, which is slow work. Probably some of our Western farmers will say this is altogether too

much expense. So it may be on new land that does not require any manure to grow admirable turnips, such as we have had this year, but even here a little artificial manure with the seed is highly important to give the plants a vigorous start, to get out of the way of the fly, and other numerous enemies of the turnip crop, and on old land, such as a considerable portion of New York State, and some others, the expense is trifling compared with the beneficial result."

Seed to the Acre.—Sow a pound to the acre is the English rule; this should be varied according to soil and circumstances—sometimes more, sometimes less. "Sow thick enough, so that if the fly does attack them there will be plenty left for a crop; besides, the thicker they are sown, the quicker they will be out of danger, the plants drawing each other up."

After Cultivation.—WILLIAM BEEBE, in a prize essay in the *Country Gentleman*, says: "The young plants will make their appearance in about six or seven days. As soon as they can be distinctly seen, they should have the horse-hoe run through them, and when the plants are about three inches high they will be ready for hand-hoeing; and this is one of the most particular operations of the whole. If the horse-hoe has been properly used, it will have left a ridge from three to four inches wide, and two to three inches above the general level, with a row of plants in the center; these are singled out with the hand-hoe, by alternately pushing and pulling, which will give the ridge the proper form, being careful to leave but one plant at intervals of twelve inches, and if the land is very rich, they may be left still further apart. I have had the greatest difficulty in getting men to hoe properly; they will leave them too close. If your land has been properly cleaned before sowing, it will require very little attention—now running the horse-hoe through a couple or three times, and it may require going over again with hand-hoes. But if the weeds make their appearance, keep up the battle. You can't grow both. Whenever they show themselves keep the horse-hoe moving; let them get once well ahead, and you are beaten. A man should horse-hoe from four to five acres a day, and single hoe one-third. When sown on the flat he won't be able to do so much, and the plants may be left still further apart. When singling, save some of the finest plants to fill up blanks with, if there are any. *Swedes* will do very well transplanted; white or common turnips won't bear it." Most farmers

think that six or eight inches apart are thin enough.

Harvesting.—Among the large stock-growers of our Western States, ruta bagas are seldom harvested at all, but are eaten from the soil where they grow. As soon as they begin to mature, the cattle or sheep are turned into the field for an hour in the morning and an hour at night, from day to day, and allowed to feed upon the roots which stand mainly above the ground. In this way, the labor of harvesting is saved, and the soil gets the manurial benefit of such bits of roots as the stock may leave.

Mr. ANDERSON, above quoted, says of harvesting: "This I have done by topping the turnips with a hoe as they stand in the rows. A quick hand will top two acres in a day; after this we run the skeleton plow, with a flat share, simply to cut the tap-root, leaving the turnip in the same position. The man holding the plow can very easily tell when he is cutting the root in the right place, by the feeling of it. In speaking of this plan it will be understood to refer to ridge or drill work." If the turnips are sown broadcast, they are best gathered thus: Take a sharp hoe, and with one motion clip off the top, then strike the corner of the hoe under the root and turn it out. Take a swath about four or five feet wide, and as you jerk them out, throw them into rows. Then go through with your cart, and with pitchforks pick them up and throw them on—not by striking the fork into them, but by slipping the tines under them.

Storing.—Turnips should not be kept in cellars in large quantities, but should be stored in pits, as already described for potatoes.

Profit as a Crop.—The cost of production can hardly reach fifty dollars an acre, in the very worst soil. The expense will not generally exceed five cents per bushel. With good care six hundred to eight hundred bushels to an acre can easily be grown, and some farmers have raised as many as fifteen hundred bushels to an acre. At a shilling a bushel, an average crop would show a good profit.

Conclusion.—Mr. GIBSON closes his essay as follows: "In summing up, the main things to be attended to are thorough pulverization of the soil; the crop to be kept well clean; you may as well expect figs from thistles as to expect turnips to grow with weeds. Give plenty of manure; the turnip is grateful and will pay you good interest for what it uses, and what remains will not be lost, the next crop receiving the benefit. Keep the horse-hoe moving, even if there are no weeds. Give plenty of room;

let there be not less than twelve inches from plant to plant. Do everything required in its proper season. What is it that has brought the land in some parts of England to the present high state of cultivation? Sheep and turnips. I know large tracts of land in Lincolnshire, which thirty years ago, were let at two shillings sixpence, merely as rabbit warrens, being thought too poor to grow anything—light blow-away sands—which are now being let at fifty shillings, equal to ten dollars, per acre per year; by growing white clover and turnips, and eating all on the land with sheep, it soon became capable of growing barley, and now as fine crops of wheat are grown as can be found. And you may depend upon it, that in whatever district in this country turnips are grown to any extent, there you will begin to see the land increasing in fertility. It is a crop that demands such cultivation to be grown successfully, that the land and other crops will feel the benefit of it throughout the rotation, and then the farmers' motto will be the same as mine, viz.: 'More roots, more stock; more stock, more manure; more manure, better crops.'"

Turnips among Corn.—A snug little crop of turnips may be raised among corn without injury, if sown very thinly at the time of second cultivating. The turnips will take the place of late weeds and grow a month after the corn is cut. They should, however, be sown thin, and a little earlier than in open ground.

Wheat.—This is the most important and the most widely cultivated of the grains, because it is the most nutritious and palatable. EZEKIEL speaks of it as being an article of commerce in the land of Judah. ISIS was an Egyptian goddess, worshiped as the greatest benefactor of the country, because she taught the cultivation of wheat and barley. CERES fills a similar place in Grecian mythology; she gave to TRIPTOLEMUS the first grains of wheat, and he gave them to the world.

Whether the wheat plant has always been as we now find it, or had its origin in an inferior plant, is a question not well settled. A French gardener, M. FABRE, sowed the seeds of a coarse grass, named by botanists *agilops*, in the Fall of 1839, which ripened in July following. Its seeds he sowed in the Fall of 1840, and continued sowing the seeds every year until in 1845, when the plants then raised were regarded by all who examined them as genuine wheat plants. Its changes from the coarse grass were gradual, at first producing few seeds, but increasing in

number as its resemblance to a wheat plant became stronger. This experiment would indicate that the wheat plant is the result of cultivation, and that the ancient wheat of Egypt was originally much inferior to that at present cultivated.

Brought to America.—When America was discovered, wheat was not found on this continent. It was, however, soon brought here, and a slave of Cortez finding a few grains in some rice, sent from Spain, carefully preserved and planted them, and from these, it is believed, the wheats of Mexico and the Northern Pacific have been derived. It was introduced into the Elizabeth islands of Massachusetts, by BARTHOLOMEW GOSNOLD, when his colony made a temporary settlement there, in 1602, and found its way in 1611 into Virginia. In 1718 it was brought into the Valley of the Mississippi, and in 1746 flour was first shipped from the Wabash river to New Orleans. This was the commencement of a trade that has become a part of the history of the West, and rendered the free navigation of the Mississippi so essential to its prosperity that no political changes or necessities will ever be permitted to close or obstruct it.

The true and infallible symbol of civilization and refinement is the wheat plant. No unenlightened nation ever cultivates it; no enlightened nation ever neglects it. Our Aborigines fully appreciated the influence of the wheat plant on society, if the following anecdote, related by CREVECEUR, the old French traveler, has any foundation in fact: The chief of the tribe of the Mississais said to his people, "Do you not see the whites living upon seeds, while we eat flesh?—that flesh requires more than thirty moons to grow up, and is then often scarce?—that each of the wonderful seeds they sow in the earth returns them an hundredfold? The flesh on which we subsist has four legs to escape from us, while we have but two to pursue and capture it. The grain remains where the white men sow it, and grows. With them Winter is a period of rest, while with us it is the time of laborious hunting. For these reasons they have so many children, and live longer than we do. I say, therefore, unto every one that will hear me, that before the cedars of our village shall have died down with age, and the maple trees of the valley shall have ceased to give us sugar, the race of the little corn (wheat) sowers will have exterminated the race of the flesh-eaters, provided our huntsmen do not resolve to become sowers."

Production.—In 1850, the United States pro-

duced 100,485,944 bushels; in 1860, 173,104,924 bushels—a gain of seventy per cent., and an increase, in proportion to population, of more than twenty-five per cent. In 1850, Pennsylvania ranked first as a wheat-growing State, Ohio second, and New York third; in 1860, Illinois stepped forward from the fifth to the first rank, Indiana to the second rank, and Wisconsin, from the ninth to the third rank. In New England, the production of wheat, little as it was in 1850, was even less in 1860, only enough being grown to feed the people for two months. The same is true of the Middle States, where the population during the decade had increased two millions.

In 1867, the estimate of the United States Agricultural Department of the year's crop, was 212,000,000 bushels, and Wisconsin had risen to the second rank in the amount of production.

A Look Ahead.—The question is forced upon us, Will the West continue to furnish wheat for export, after feeding the increasing population of the States east of the Alleghanies?

The belt of country adapted to wheat-raising is certainly broad enough. Some theorists have tried to limit its natural range to ten degrees of latitude—between 33° and 43° north. But experience definitely refutes this, as is shown by the following, from the Census Report for 1860:

STATES.	1850.	1860.
	Bu- hels of Wheat.	Bushels of Wheat.
Minnesota	1,401	2,195,812
Texas	41,729	1,404,273

The growth of vegetation in Minnesota is exceedingly rapid, for the Summers are warm. The isothermal and isothermal lines passing from New York westward bend gradually to the north, round Lake Michigan, and reach the Pacific by passing through Minnesota and Dakota. Minnesota is now perhaps the best wheat-growing State in the Union, excepting California, which still maintains the high average of sixteen bushels to the acre.

The damaging fact, in this connection, is that the average amount of wheat grown per acre in the United States is constantly diminishing. Hard cropping and thriftless culture are responsible for the degeneracy. JOHN H. KLIPPART, Secretary of the Ohio Agricultural Society, in an admirable volume* on the growth of the wheat

* "The Wheat Plant, its Culture and Diseases," 700 pages, 12mo.; by JOHN H. KLIPPART. Published by MOORE, WILSTACH & MOORE, Cincinnati, Ohio.

plant, says: "Virginia, Maryland, and Delaware, as well as New York, were formerly great wheat-producing sections. But many parts of New York, that formerly produced twenty-five bushels to the acre, do not now average over five bushels, and many parts of Maryland, Virginia, and Delaware, that formerly produced abundantly, will not now pay the cost of cultivation. *Exhaustion* is written all over them in language too plain to be misunderstood."

Mr. KLIPPART, in his report for 1867, reveals the unwelcome fact that Ohio is following in the same road—there being, in that year, only two-thirds as many acres sown, and only one-half as much wheat grown as in 1850. He says: "Estimating that the population of the State, during the years 1864-5-6, was 2,500,000, and that each individual consumes five bushels of wheat per annum, then 12,500,000 bushels were required for bread within the State during each one of these three years—but the product, after deducting seed, was, at most, 9,500,000 bushels per annum—leaving an absolute deficit of three million of bushels per annum for each one of the years just named." The average per acre was also lower than ever before.

It is a melancholy truth, says KLIPPART, and one that reflects much on the skill and foresight of American farmers, that, while the wheat crop of England has increased at least fifty per cent. in the last century, that of the United States has fallen off in nearly the same proportion. He claims that little of the West is really well adapted to permanent wheat growing, because a large mixture of clay in the soil is necessary to the perfect growth of wheat, whereas the prairies are a rich friable mold, lacking the proper proportion of clay. To show that our wheat region is not capable of producing so great a surplus as we imagine, we have only to look at facts instead of fancies. We may take, perhaps, as the average crop of wheat produced, that of 1848—which was 126,000,000 bushels—and our population 22,000,000, which gives a trifle over five and a half bushels to each inhabitant. Now the consumption of wheat in England is 166,000,000 bushels annually, which gives six bushels to each inhabitant—about half a bushel more to each person than we should have if we consumed our whole crop. It is true we have a surplus that will average ten or twelve million bushels a year for export, but that is produced by the substitution of corn for wheat as an article of bread. Cut off this substitute and we should be our own

consumers of all our own wheat, and there would be a scarcity besides.

Our resource now, continues KLIPPART, is to preserve our wheat lands where they are not exhausted, and to restore them where they are. Under judicious and scientific tillage, the lands of England, that have been under cultivation for hundreds of years, now average twenty-five bushels to the acre. This is done by a liberal use of lime, plaster, clover and a judicious rotation of crops. In wheat-raising, this rotation is clover and corn. Peas, beans, turnips, beets, and carrots all furnish a desirable rotation, and furnish excellent food for sheep, which are good on wheat land. In fact, the culture of wheat and raising of sheep should go together. The rotating crops furnish food for the sheep, and the sheep furnish the best of manure for wheat land. All the manure derived from the sheep should be carefully preserved for enriching the land. It is highly concentrated, and prepares the land for a generous crop of wheat at a small expense. The manurial agent consumes the crop that gives the land rest from wheat culture, and prepares the soil for another crop of wheat.

It may be laid down as an axiom that, climate and local circumstances being the same, what one soil will produce, another by scientific cultivation may be made to produce; and that the farmer, from a like amount of skill and labor in the cultivation of the soil, may anticipate the same results that have attended like efforts in other countries. If they pursue the exhausting process that has impoverished Virginia and some other States, they will reap an abundant crop of poverty and exhaustion. The work is going on rapidly. The estimated loss, by exhaustion, in the United States, is, annually, \$30,000,000. This is equivalent to a loss of \$500,000,000 capital, at six per cent. If, by scientific cultivation and manuring, our farmers will arrest this system of exhaustion, they will restore this capital; and these lands, that now produce from five to thirteen bushels of wheat to an acre, can be made to produce as they do in England—twenty, forty, and eighty bushels.

Mr. J. R. DODGE, of the United States Agricultural Department, visited the Northwest in 1868, and, on his return to Washington, painted the following humiliating, but truthful, picture: "Western wheat culture is ruinous in impoverishment of the soil, in deterioration of the seed, in overrunning the country with weeds, in promoting a false and wasting sys-

tem of economy. The prevalent mode of operating involves first a partial breaking of the soil, rendering sowing irregular in position and depth, and drilling difficult and imperfect, giving weeds quite as good a chance as wheat. The next year a superficial, hasty plowing partially covers the stubble, and very slightly the tangle of weeds, and wheat is again put in. Year after year wheat follows wheat, and weeds increase, while the yield of grain diminishes, partly from loss of certain elements of the soil, and partly because weeds have usurped a large area of the fields. In the meantime, as if to increase the loss from the wheat necessarily carried away, the straw by millions of tons, worth almost as much per ton for feeding, as the marsh or prairie hay of the country, is burned nightly in harvest time, till the sky is bright with a holocaust of greenbacks in straw; and the excuse for thus dissipating in thin air, not only elements of nutrition, but valuable elements of fertilization, is that the way may be clear for the plow to scratch over again the maltreated soil.

This picture may not be verified in every wheat field of the West, but who will deny its striking likeness in most cases. Is proof of impoverishment wanted? One witness only is needed—the soil itself. First, thirty bushels per acre is the boast of the farmer; then the yield drops to twenty-five, to twenty, to fifteen, and finally to ten and eight. Minnesota claimed twenty-two bushels average a few years ago (some of her enthusiastic friends made it twenty-seven), but she will scarcely average this year twelve, and will never again make twenty-two under her present mode of farming. To be sure, there are excuses. The seasons do not suit as formerly, blight or rust comes, or the fly invades, but all these things are evidences of exhaustion, and prey upon the soil in proportion to its deterioration."

Agriculture in the Middle and the older Western States is in a transition between the savage method of skinning and the civilized method of culture.

The *Annual Register of Rural Affairs* says: "There is no question that the common belief that the wheat crop is not adapted to certain places, has been, at least, partly owing to bad management. When the country was new and the soil fresh and productive, good crops were obtained with but little difficulty. General success led to carelessness; grain was sown after grain, without regard to a proper rotation, and the soil became gradually exhausted and filled

with weeds. This pernicious course was much practiced in the best wheat regions of western New York, and the crops became so reduced that some went so far as to predict the entire failure of wheat raising. But by the adoption of underdraining, cleansing rotation, and enriching by clover, and a judicious application of manure, many have succeeded in obtaining a gradual increase in successive years, until the original yield of the fresh rich soil, has been exceeded."

Farmers are proverbially slow to adopt new ideas. They abstract from the soil the accumulated organic matter, and do not realize the necessity of replenishing it. They exhaust the salts and the humus, and return nothing but more seed. This, with shallow plowing and no irrigation or draining, and little rotation is working the mischief.

We invite thoughtful attention to the following words of Mr. CAPRON: "With the prevalent mode of culture, in very compact soils, wheat roots are so near the surface as to be thrown out by the mechanical displacement of freezing and thawing, and, if not utterly destroyed, they struggle fruitlessly to pierce the unbroken subsoil, packed, perhaps, by the tread of cattle for a century, and finally yield to the blasting power of an early drought, blighted, shriveled, light, worthless for seed, and of little value for bread. The drill, planting the seed firmly in the earth instead of scattering it on the surface, already saves half the Winter killing in the fields where it is used; and deep culture, with proper drainage, would procure exemption from most of the remaining liabilities, and, ordinarily, from all danger of loss from drought. The advantage of additional depth of pulverization, therefore, would often be far greater than the proportionate increase of depth, and the profit of the improvement would be increased in corresponding ratio. In this country the average yield per acre of one of the principal staples, wheat, under our system of shallow cultivation, has been gradually lessened, until at the present time it does not exceed twelve bushels per acre, while England, with her deep tillage and rotation system, has raised her average to twenty-eight bushels. Estimating our wheat area at 18,000,000 of acres, and allowing an increase of sixteen bushels per acre under a system of thorough and judicious cultivation, the increased production would amount, annually, to 288,000,000 bushels; and wheat is but one of the staples to be benefited by such improvement.

"Deep cultivation is a prime necessity of root-culture, which forms the basis of English agriculture, and enables the English farmer to pay annual rents equivalent to the fee-simple value of our farms. The growing of these 'green crops' results in a more thorough admixture of the food-producing elements of the soil, and its prompt permeation by water and the gases, which are so necessary to plant-growth. France, following in our footsteps, or we in hers, in at least one particular—the want of a proper rotation system—has reduced the average yield of wheat to fifteen bushels. The single fact that, while England has two acres in 'green crops' for every acre in wheat, France has three acres in wheat for every acre in green crops, and that with us roots are scarcely raised as a farm crop, explains the cause of the great discrepancy in the yield of that valuable cereal in these countries."

Hon. J. C. G. KENNEDY, Superintendent of the Census, says in the same vein: "English farmers, guided by close observation and experience, have slowly worked out an admirable system of rotation, and now scientific investigations have elucidated the principles upon which it is founded. We may not be able at present to pursue generally the same system of rotation in this country, but the *principles* are as applicable here as there, and, if adopted, will produce the same beneficial results. The application of *plaster, ashes, superphosphate of lime*, and other mineral manures, has rarely any great effect on the growth of the cereals; but *superphosphate of lime* has an almost magical effect on turnips, and plaster usually increases the growth of clover, so that these mineral manures, when applied to these crops, may be rendered, indirectly, of great benefit to the cereals.

"An English farmer once said to the writer, 'insure me a good crop of turnips, and I will insure you a good crop of barley, and of every other crop in the rotation.' Of so much value do British farmers consider the turnip crop as a means of enriching the soil for the growth of the cereal grains, that they spend more money in preparing the soil for turnips than for any other crop, frequently fifty dollars per acre. The turnip crop enables the farmer to keep an immense stock of sheep and cattle, and thus enrich the soil; the ammonia which turnips obtain from the soil, the rain, and the atmosphere being retained and left on the farm for the use of the following cereal crops. In the Norfolk or four-course system of rotation,

one-fourth of the arable land is sown to turnips, followed by barley, seeded with clover. It then lies one or two years in clover, followed by wheat at one furrow. After the wheat, turnips again follow, and so on as before. Latterly, by the use of *superphosphate* and *guano* for turnips, and by feeding large quantities of oil-cake and other purchased cattle-food, the land in England has become so rich that many farmers have thought it necessary to introduce an extra grain crop into the rotation, in order to reduce the soil. But hitherto the rule has been never to take two grain crops in succession.

"How different from this is the practice of some of our American farmers! Corn, barley, and wheat often follow each other in succession; then seed down with timothy, red-top, or some other exhausting grass; take off all the hay and then renew the process. To call this a 'rotation of crops' is absurd. We might as well grow a crop of Indian corn every year. *We must alternate the cereals with crops of clover, peas, beans, tares, and other leguminous plants, or turnips; feed them out on the farm, and carefully save and return the manure to the soil.*"

Every plant uncared for shows a tendency to degenerate. As culture has much to do in developing new varieties, so the neglect of it will do much to destroy them, and there is no doubt that our best fruits, if removed from our orchards and gardens to their habitats in the forests, and reproduced from their seeds for a series of years, would be no better than the original species in a wild state. The delicious Newtown Pippin or the Pearmain would be no more agreeable in flavor than the little European crab apple (*Pyrus malus*), from which they probably originated. Professor A. GRAY, in his Botanical Text Book, says: "The races of corn, wheat, etc., which now preserve their character unchanged, have become fixed by centuries of domestication. Even these at times manifest an unequivocal disposition to return to their aboriginal stock. Were cultivation to cease they would all speedily disappear; the greater part, perhaps, would perish outright; the remainder would revert, in a few generations of spontaneous growth, to the form of the primitive stock."

There is, perhaps, no one fact which gives a clearer idea of the great growth of the West, and the increase of its products, than the amount of grain which is shipped each year from Chicago. In 1838 seventy-eight bushels of wheat comprised the total exports from what has since become the greatest grain mar-

ket in the world. In 1839 it was 3,678 bushels; in 1840, 10,000 bushels; in 1841, 40,000 bushels; in 1842, 586,907 bushels; in 1845 it first reached a million bushels; in 1847 over 2,000,000 bushels. In 1851 and 1852 it again fell off to less than a million bushels; but, in 1853 again rose to 1,680,998 bushels. In 1854 it was 2,744,860 bushels. In 1855, 7,110,270 bushels; in 1856, 9,419,365 bushels; in 1857, 10,783,292 bushels; in 1858, 10,759,359 bushels; in 1860, 16,054,379 bushels; in 1861, 22,913,830 bushels; in 1862, 22,902,765 bushels; in 1863, 17,925,336 bushels of wheat.

Russia is our only conspicuous competitor in supplying the English demand for breadstuffs; and in this rivalry we have every advantage. Russia is wanting in sea-coast; while her distance from the markets of Great Britain and France, and the lack of a large commercial intercourse with those nations tend to limit her exports to the contiguous continental nations. This will permanently leave every surplus bushel of American wheat in demand. We have everything essential to success—a vast wheat region, the best means of transportation, and a great and increasing home and foreign market. Shall indolence and slovenly culture prevent our vigorous West from winning the prize, and holding it?

There must be a radical revolution in tillage, or we have arrived at the maximum of production. "Our population doubles in about twenty years, yet the relative diminution in our wheat crop is so great that, unless our mode of agriculture is improved, and the ratio per acre increased, the export will entirely cease, and we shall not produce enough for ourselves."

Soil.—Soils of a medium quality should be selected, says KLIPPART. Those which are too rich, such as the black mold, or black sandy soils of the river and creek banks, or low places, should never be selected for wheat. They are unquestionably better adapted for corn and potatoes. The soils on "bottom lands" as they are generally termed, consist in too great a degree of organic matter—of humus, and decaying or decayed vegetable matter, to grow wheat to any advantage to the grower. They lack the proper *earthy* materials, or if they possess them, they are not in a proper chemical condition for the purposes of the plant. It is a generally admitted fact, that on such soils the wheat grows very rank, producing straw of enormous growth, but the heads are invariably small, even of the best varieties, and produce very few and indifferent grains of wheat.

Aside from this, wheat grown on low places is more liable to suffer from frost, mildew, rust, and insects, than that grown upon higher grounds; it is also as a general thing much more liable to fall or lodge.

The best lands for wheat are those in which the principal ingredient is clay—either red, yellow, or white, of which the white, however, is always the poorest. There is no doubt that more labor must be expended on a *pure* clay soil than on almost any other; yet when properly managed it yields more uniformly, and gives larger crops of wheat than any other soil. The first thing to be done after clearing a piece of clay soil, is, to have it thoroughly drained, before it is "broke up." Clay retains more moisture than any other kind of soil; but when it loses its moisture, it becomes drier and harder than any other. A new clay will shrink or contract fully one-sixth in sun-drying or "baking;" it is easy to imagine what effect this shrinkage will have upon the tender rootlets of the plants. Lime in considerable quantities should be applied on new clay lands, to neutralize the excess of acidity with which they are almost universally impregnated.

Where deep snows protect the crop, as north of the southern margin of our northern lakes, a light, carbonaceous soil is productive, which in more southern latitudes would be unsuitable. Where the snow is not an adequate protection, the substitution of Spring wheat obviates the natural difficulties to which the Winter varieties are there subject. In the southern and middle portions of the wheat region the tenacious clay soils are made more productive by manures, deep plowing, drainage, and drill planting. And where clay subsoil underlies a light carbonaceous top soil, the mixture of them by deep plowing is highly beneficial.

Preparation of Soil.—Almost all clay soils of the West will bring good wheat for three or four years without manure, but it is better not to take off more than two or three crops without manuring. Barn-yard manure made on the farm is the best general fertilizer for wheat. When the land is much worn, two bushels of lime, and three of salt to the acre, is probably the best and cheapest fertilizer that can be used. Fall plowing often brings from five to seven bushels of wheat to the acre more than Spring plowing. Deep plowing is the best, as it lets the frost deep into the soil, preparing it for a crop the coming season, and destroying many seeds and insects.

Various Aids.—All old soils—by which we

"The large percentage of gluten obtained by the use of the first five manures is very striking, if the determinations are really to be depended upon. They are certainly interesting in a theoretical point of view, and are deserving of careful repetition. In reference to their bearing upon practical farming, however, it must not be forgotten that the results of small experiments are never fully borne out when they are repeated on the large scale."

Looking at the extent of wheat cultivation in the West, it is obvious that barn-yard manure can not be produced in quantities at all approaching the demands of that husbandry which should regard the fertility of the soil as one of the highest ends it can have in view. Special manures, such as guano, admissible near the sea-board, and for products bearing a high price, can not be much relied on in the Western States. The only means for general manuring is applying all the product of the barn-yard, in turning under green clover crops, and in hogging down others, such as corn, rye, and oats.

Western farmers need to be constantly and repeatedly impressed with the necessity of giving all their manure and all their wheat straw back to the soil. Some do this; but there are thousands of farmers along the frontier who never think of carting a load of manure, except perhaps, upon some choice garden corner; whose barns lie smothered in filth, the undisturbed accumulations of years! We have been into, or rather upon, barn-yards where manure was eight to ten feet thick; and we know of many other farmers—if we may abuse a respectable craft by applying their name to such wretched spendthrifts—who move their barns from year to year, that they may "have a clean spot," and avoid the necessity of moving the heaps of rotted dung! And these are the same men who burn their straw, instead of cutting it and returning it, either through cattle or without cattle, to the compost heap and thence to the soil. They are not farmers; they are plunderers, and they deserve nothing better than crop-degeneracy and personal bankruptcy, unless they can learn more rational habits.

Mineral Manures.—There are but two mineral manures for wheat that can very profitably be used by the Western farmer, gypsum or plaster, and lime. In connection with clover crops both are valuable, but especially the gypsum, called by chemists sulphate of lime, being composed of sulphuric acid and lime. The ash analysis of clover shows that these constitute a

large portion of its mineral elements, and hence the cause of its heavy growth when gypsum is sown on the young clover.

Effect of Plaster.—General ORR, of Laporte county, Indiana, an enterprising farmer, tried a series of experiments with plaster, which seemed to justify the following conclusions: 1. That three-fourths to one bushel of plaster per acre on lands which have produced grain for a number of years in succession, applied on a well-set, growing clover crop, at some six inches high, and plowed under when the seed balls have all turned brown, will add fifteen to thirty per cent. to a succeeding wheat crop over the same clover turned under without plaster. 2. That the vigor imparted to the growing grain by the use of plaster, will, in a great degree, prevent the ravages of the fly on such varieties as the fly works most upon. 3. That clover and plaster, on most soils, are the cheapest manures that the farmer can use, yet he should not neglect the use of any others within his reach. He adds that the cost of the plaster used and of putting it on was about fourteen dollars, or fifty cents per acre.

Effects of Lime.—Says LEWIS BOLLMAN, of Bloomington, Indiana, in an exhaustive essay on wheat culture to which we are much indebted: "Lime acts as a manure in three ways: by what it gives directly to a plant requiring it as one of its constituent elements; by decomposing vegetable matter, thus fitting it for the immediate support of the growing crop; and by making soluble the silica and other minerals of the soil. The importance of this last-named action may be seen from the analysis. To every ten bushels of wheat raised there are about twelve hundred pounds of straw, and this straw contains seventy-two pounds of minerals, of which forty-seven is silica. Where the straw is removed from the field it will be readily seen how great is the need of this solvent action of lime to render the flint in our soils capable of supplying their large amount of silica, for the silica is dissolved flint. But an immediate and visible effect of lime depends upon the amount of vegetable matter in the soil. A neighbor who limed several of his worn-out fields remarked to me that he would not give leaves of trees for any amount of lime; for alongside one of the fields the leaves had blown on it from an adjoining woodland, and on this portion he had raised excellent wheat. Here the lime found vegetable matter to act upon; in the other portions of the field it did not. Hence the liming should be on a full clover

crop, and both turned under together, or on a heavy blue-grass sod."

Lime is not properly appreciated in the West, to add to rich prairie lands as a support for wheat straw. In England, where they raise larger crops of wheat than we think of getting, lime has long been the main dependence. More ought to be used in the Western States; and in many localities it can be made for fifteen cents a bushel.

Varieties.—LINNÆUS comprehended all the different varieties of wheat known in his day under six species; but modern botanists enumerate about thirty species, and some hundreds of subvarieties brought into existence by continued cultivation. For mere practical purposes it is sufficient to have two general classes, namely, white and red, and the varieties distinguished by their spikelets, as the smooth or bearded, the woody-chaffed or the hairy-chaffed.

"Before the appearance of the wheat midge," says the *Annual Register*, "the *Soule* wheat was one of the most popular and valuable sorts throughout the Northern and Western States. The wide destruction produced by this insect led to the general introduction of the *Mediterranean*, which was found commonly to escape. This sort has now been cultivated many years, and from the success which has attended its crops, it has no doubt proved in the aggregate worth hundreds of millions to the country at large. The *Blue Stem*, a smooth, red variety, is an old well known sort, largely cultivated in the South. There is also a white variety of the same name, considerably resembling the old *White Flint*. The straw having a bluish cast below the head has given it this name. The *Lambert* is a newer sort, more lately introduced, and much cultivated in portions of the West. It is a red chaff, bald wheat, of good, but not of the highest quality, ripening a little earlier than the *Mediterranean*, and remarkable for its entire freedom from the attacks of the midge. The *Early Virginia May* has been a very popular sort at the Southwest; but, although promising well for a time in some places, on its introduction into the North it has not generally succeeded, and has now nearly passed out of cultivation. It is a white, bald variety, but not quite so white as the *Soule*. The *Diehl* wheat is a new sort not yet sufficiently tested to prove its standing, but recommended by some for its earliness, freedom from the midge, and general value. It is a bald, white wheat, with a short straw and short head." The *Rural New Yorker* speaks well of the *Diehl* wheat, and

says that a farmer of the vicinity raised three hundred bushels from ten acres.

ISAAC DILLON wrote from Zanesville, Ohio: "The best varieties of wheat are red. The old Red Chaff Beardy stands at the head decidedly, it more uniformly yields a fair crop; the berry is not equalled by any other red wheat; the flour is much finer. This wheat, of good quality, is not excelled by any other whatever, except where fancy pastry flour is wanted. For sweet, tough bread, absorbing the greatest quantity of water, it is ahead of white wheat; and take it all in all, the Red Chaff Beardy is the best wheat for all purposes we have in the United States."

General HARMON, of New York, to whom the country is indebted for several of its best varieties of wheat, said on this question: "In selecting the best Winter variety, I will name the ones that I believe will do best on the different soils where wheat is sown. There are some varieties that succeed better on some soils than others. If the soil is rich clay loam, it is important to sow a small and early variety: the *Kentucky White*, better known as *Hutchinson* wheat; *Mediterranean*, or *Wheatland Red*. If sandy, gravelly loam, the improved *White Flint*, old *Genesee Red*, *Chaff Bald*, *Saul's Wheat*, and *Flint*. In selecting the variety that will do best on all soils, I am confident the improved *White Flint* stands first for the quantity and superior quality, producing more flour of superior quality than any other of nearly forty different varieties that I have had under cultivation."

Selection of Seed.—The tendency of our wheat to degenerate already referred to, is attributable partly to the careless manner of selecting seed—if that method can be called "selecting" which carts the seed promiscuously from the granary to the field, year after year, with little or no thought that its quality will affect the quality and quantity of the harvest. Almost every good farmer now selects, and saves with the greatest care, his best Indian corn for seed, and as a result corn deteriorates less than any other cereal that grows. No man expects a superior colt from an inferior dam or sire, and the sheep-breeder rigidly culls his flock. This simple rule neglected, the finest stud, herd, or flock rapidly degenerates. The vegetable kingdom is subject to the same law. Like begets like; and the best crop, other things equal, comes from the best seed.

Wheat for sowing should be chosen and preserved with the greatest attention. A variety

should be selected by comparison, which yields well, is hardy, commands a good market, and makes a good article of flour. When such is found, secure it, even at a liberal outlay of money. Having once obtained it, endeavor to improve upon it by selection and cultivation. Select the earliest and longest heads from the field, or that part of the field containing them, and let it get fully ripe; keep it separate from the general crop, thresh it with the flail, clean it; then separate it with a sieve which will pass all the small, shrunken grains. A further improvement is by throwing it across a long floor, rejecting all that falls short as light, and retaining for seed the heaviest and best, which goes beyond. This process will effectually clear the grain of cheat and other foul seed. Mr. CHARLES DARWIN, in "Variations of Animals and Plants," says that "Colonel LE COU-TEUR, in his persevering and successful attempts to raise new varieties by selection, began by choosing the largest ears, but soon found that the grains in the same ear differed so that he was compelled to select them separately, and each grain generally transmitted its own character." Careful selection will prove an important auxiliary in the systematic effort that ought to be made to restore the wheat crop of America.

The best farmers of Germany have adopted a system of seed exchanges, whereby new seed is introduced to each farm every few years, some even obtaining seed from distant countries for this purpose. The plan is believed to be beneficial. The exchanges are conducted by the local agricultural societies. Undoubtedly a change of seed is occasionally a good, or even a necessary thing; just as the Shorthorn or Devon breeder purchases from a distant herd to mingle through his own stock a different strain of blood. But *care in selection* is more important than exchange. The well-known pedigree wheat, about which so much has been said in the English agricultural journals, was produced, like the "barrel wheat," simply by following this rule of the transmission of qualities—selecting the best heads from the field, and then the best grains from the head, and continuing the process for a series of years.

Pickling of Seed.—It is now generally admitted that pickling seed-wheat acts as a preventive of smut. Having cleaned your seed as above, prepare a pickle of salt dissolved in water sufficiently strong to bear up a potato, and for half a barrel of such pickle add half a

pound of blue vitriol. When all is dissolved, put in the seed, stir it well, and skim off all that rises to the surface; throw the remainder into a basket to drain; let this be done ten or twelve hours previous to sowing. Just before sowing, spread it on a tight floor, and roll it in slaked lime, plaster, or ashes, reduced to a powder, stirring it well with rakes.

Thick Sowing vs. Thin Sowing.—The report of the United States Department of Agriculture for February, 1868, says: "Too much seed is used in wheat culture. Scarcely less than twenty million of acres will suffice for the wheat area of the United States, requiring nearly thirty million bushels of seed, and little more than ten bushels per acre are produced. Ten million of bushels of this seed, worth perhaps sixteen million of dollars, might be saved to the country, sold for bread, and the proceeds applied to the cultivation of growing wheat, with a fair probability of obtaining by such means, more than twenty additional million of bushels for the bread of the nation. So large a portion of this seed is now wasted by sowing at irregular intervals and at unequal depths, and so much is choked by weeds, that farmers say they can not use a less quantity; but with universal drilling, at a width sufficient to allow the tillering and growth which would result from hoeing or cultivating, two-thirds of the present supply would be more than ample.

"Is not a severe reflection upon the judgment and skill of wheat growers, furnished by the fact that ninety-nine out of a hundred of them 'run out' their seed in a few years, and depend upon the special culture and superior judgment of the remaining one to furnish them with improved seed at four or five dollars per bushel?

"About one bushel in every seven produced in the United States is saved for seed, when the requirement should be no more than one for every twenty. Thus millions of bushels are wasted, buried in the earth, with no prospect of resurrection, and sacrificed to ignorance and thriftlessness. It is taking the children's bread, without the poor satisfaction of having fed a dog with it.

"Such waste may be avoided. Thin seeding is impracticable with poor culture, though the result varies little whether it is thick or thin; it is not only practicable, but necessary, in connection with deep plowing, thorough tillage, and cultivating for the purpose of killing weeds, admitting air, and retaining moisture about the roots of the plant."

An article by an English farmer presents a large number of facts, obtained by an extensive correspondence with farmers in England who have tested the thick and the thin sowing of wheat during the previous years. The testimony is so strongly in favor of thin sowing that it appears wonderful that English farmers have not adopted the system generally. The requisitions are, that the land shall be in the best of tilth, the seed of the best character, and the variety pure; also, that it be planted so as to give each seed one foot square of soil. It appears from the experiments mentioned that the more grain sown the fewer the number of ears to each grain per acre. By special culture of small spots, a crop at the rate of 108 bushels per acre has been produced, and another of 162 bushels per acre. The general yield is stated to be at least doubled by thin sowing. By thin sowing it must be understood that but one seed was dropped in a place.

J. J. MECHL, of Tiptree, England, the well-known experimental farmer, says that the thick sowing of grain is a great national calamity; that more crops fail to yield well from too much seed sown than from too little manure. He adds: "LIEBIG justly says that the greatest enemy to a wheat plant is another wheat plant, for the very obvious reason that both require the same food; small heads and kernels, and weak, flabby, straw, are the natural consequences of this competition. For several years I tried one bushel of wheat per acre against two bushels per acre, both drilled. The difference in favor of the one bushel was equal to a rent of 30s. (\$7 50) per acre.

"A peck of seed-wheat per acre, which I dibbled at intervals of about four and a half inches, one kernel in a hole, produced fifty-eight bushels of heavy wheat per acre, and two and three-quarter tons of straw; in fact, the thickest and heaviest crop on my farm. During Winter, a single stem only having appeared from each kernel, the land, at a distance, appeared as if unsown; but in the Spring each stem radiated its shoots horizontally, to the extent, in some instances, of thirty to forty-eight stems, and became the best crop on the farm."

The *Mark-Lane Express* gives the following result of an interesting experiment by M. VILMORIN, in France, the ground being divided into five equal portions of one hundred and twenty square yards each. It is stated that the soil was of a sandy character, and of an average degree of fertility, and had received a light manuring of horse dung.

No. of Lot.	No. of grains sown per square yard.	Gross weight of grain harvested in pounds.	Weight of different lots of grain per quart, in ozs
1	25	319	25
2	50	315	24
3	50	302	23
4	100	286	22
5	200	265	20

These figures are significant; for they show that, in this instance at least, the quantity and quality of the harvest were in inverse proportion to the amount sown. Three or four pecks to the acre are probably enough, when applied with a drill.

There are about seven hundred thousand kernels of average wheat in a bushel, which at four bushels to the acre would cast the seeds about one and a half inches apart—sixty-four to the square foot.

The Ohio Agricultural Report for 1866 rehearses the experience of Mr. HALLETT, the enterprising advocate of thin seeding, to whom agriculture owes so much. By laying down one peck of wheat and one hundred and fifty pounds of guano to the acre, he produced a crop of four hundred and eighty bushels of wheat from ten acres of land so poor that it was not regarded as worth tilling. In 1860 he harvested at the rate of one hundred and eight bushels to the acre, by planting grains of Pedigree wheat, singly, in holes nine inches apart. Afterward, planting half a peck to the acre, the grains one foot apart every way, he reaped at the rate of one hundred and sixty-two bushels to the acre.

Our farmers can not cultivate their hundred-acre fields on the garden principle; but they may carefully study the rationale of production. The conditions of thin sowing must not be lost sight of, for they are imperative, viz.: Early sowing, a well-pulverized soil, and the best of seed. Beyond the fact that these essentials can not always be complied with, the strongest objection to dibbling single grains, is, that it allows no excess or reserve of plants to make up for casualties from the attack of drought, bird, insect, or disease.

Conclusions should not be hastily drawn from the above recorded experiments, but they should promote further similar experiments, that thus the true philosophy of seeding may be ascertained. Maryland farmers frequently sow but three pecks to the acre; and a single seed sometimes throws out a hundred stalks.

Drilling Seed.—"The experience of the last few years," says the *Valley Farmer*, "has shown the great value of the grain drill to the farmer. Some years the wheat sowed by hand has

nearly all been frozen out, while that which was drilled has withstood, in a great measure, the action of the frost. The drill saves from one to two pecks of seed to an acre, and increases the crop from fifteen to twenty-five per cent. It makes an equal distribution of any given quantity of seed, covering it a uniform depth, leaving a narrow furrow with a ridge on either side, which catches and holds the snow in Winter, and in the Spring, the earth washing from these ridges into the furrows, covers the roots. It economizes labor and time. A boy with a pair of horses will drill, with ease, ten to fifteen acres a day. The accompanying cuts show the difference between broadcast and drilled wheat. In the one will



WHEAT SOWN BROADCAST.



WHEAT SOWN IN DRILLS.

be noticed the irregularity of its growth and height, while in the other its growth is uniform, vigorous, and of the same height; and, standing in rows some eight inches apart, the sun has a chance to shine in and around, and the air to circulate through the grain, rendering the straw clean, bright, and firm; and the depth to which the seed is covered—from two to four inches at the option of the operator, the drill being regulated to drop at any depth—gives it a strong, vigorous, and firm root, and it is consequently not so liable to lodge or fall down, besides making it easier to harvest."

A farmer who sows only ten acres of wheat can afford to buy a drill for it.

Depth of Sowing.—A well-known farmer favors drilling the seed at least three inches deep, because "the grain of drilled wheat being deposited as deeply as its germination will allow, its roots, both the primary or tap root, and the secondary, are beneath the influence of the surface droughts, and, receiving their moisture from the subsoil, they turn toward it," thus making stronger roots, and resisting unfavorable influences. The *Annual Register* says: "As a general average, a depth of two inches is enough. 'One inch would be better if the soil was sufficiently moist; but it is difficult to get a drill so as to deposit the seed uniformly so shallow. Some years ago the writer of this article performed a number of experiments with the following results—the depth being carefully measured, and the soil laid on the seed-wheat in an even stratum:

Planted	$\frac{1}{2}$ inch deep,	the plants came up in	5 days.
"	1	"	6
"	2	"	7
"	3	"	8
"	4	"	10
"	6	"	12

"As the crop approaches maturity, the difference between the shallow and deep planting becomes less obvious—so that one inch and three inch planting are not greatly different in their results, although the latter is a little later in ripening, and is hardly so productive."

Time of Sowing Spring Wheat.—Spring wheat is not so widely cultivated as Winter wheat, though it is often profitably grown where Winter wheat will not thrive. It is not so productive as Winter wheat; its straw is weaker; its grain less plump; its flour does not bear shipping so well, and so sells somewhat lower in market. The most popular varieties have been the Fife, Canada Club, and China Tea. Spring wheat should be sown as early as the ground can be well prepared—from March to May.

The following estimate of the region adapted to Winter wheat is from *Swery's Journal of Agriculture*, Chicago: "South of Minnesota, northern Wisconsin, and Michigan, the want of the snow coming to protect the young plants from the almost constant freezing and thawing of Winter, and drying winds of March, make it, in most seasons, a very uncertain crop. We have known good crops of Winter wheat on sod land, in the district indicated, but these are exceptions to the general rule; nor do we believe that Winter wheat, on an average, has ever paid the expense of its culture in the section now noticed. From the fact that its culture in that section is generally abandoned, and Spring wheat largely cultivated in its place, we think the question is fully settled."

Time of Sowing Winter Wheat.—The time for sowing Winter wheat in the Northern States is from the 5th to the 20th of September. If sown later it is liable to Winter-kill from an insufficiency of root; and if earlier, it may be caught by a drought, or attacked by the Hessian fly. If there is no danger from the fly or drought, it may frequently be put in during the last of August, with advantage.

Winter-Killing.—In some localities in the Northwest there is now no certain preventive of Winter-killing except to sow in the Spring. There are, however, partial remedies, practiced in Illinois, Iowa, and southern Wisconsin. One of the most effective is thorough underdraining. Top-dressing with manure, or a thin coating of straw after the ground freezes, has also proved beneficial. The establishment of tree-belts—elsewhere treated—would, it is believed, protect the land from the fatal winds of February and March, and save the crop. The tree-belt system is sure to work an agricultural revolution in the Northwest, as soon as intelligent farmers shall appreciate its manifold advantages. Meantime, they must resort to temporary expedients.

The *Chicago Tribune* speaks of "a gentleman long and favorably known to the farmers of the Northwest," who has adopted the following plan: "The ground is carefully plowed and prepared toward the last of August and the early days of September, and the wheat is then put in with a drill. A quantity of oats, equal to about half that would be put in on a like piece of ground for a crop, is then sown broadcast on the wheat, and both wheat and oats come forward, and before the cold sets in cover the ground with a mass of green. The frost kills the oats, and the decayed leaves, if they may be so called, surrounding and partly covering the still growing wheat, effectually shield it from the fatal effects of the rapid freezings, thawings, and furious winds of the early Spring."

Spring Harrowing.—In English husbandry there are cultivators so constructed that a tooth passes between each of the drilled rows of wheat, there being as many teeth as those of the drill. There wheat is rather cultivated than harrowed. But in the United States, where the rigors of Winter and the dryness of Spring (cracking open the soil) render the use of the harrow more imperative, it is almost wholly neglected. The reason of this is the pressing demand of Spring labor for the corn crops, and the custom of sowing clover-seed on it in

March. Still, there are many who could harrow their wheat fields, but do not, simply because it is not usual to do so.

We quote THAYER to show its utility: "Wheat requires more careful and continuous attention throughout the whole period of its vegetation than any other kind of cereal, and it amply repays all the labor and pains bestowed upon it. If it is only just beginning to vegetate in the Spring, and the soil is tolerably dry, nothing will prove so beneficial as to pass a harrow, having iron teeth, over it. By this means the crust will be broken up, which has been formed over the ground during the past Winter, and the superficial stratum of the soil brought into direct contact with the atmosphere; the coronal roots, which shoot about this time, there find around them a soil recently impregnated with atmospheric matter, which tends greatly to favor the growth of the plants, while those weeds which shoot up at this season will all then be destroyed by the action of the harrow. A fine day should be chosen for this operation, which must be boldly undertaken. If, after this, the field has every appearance of being newly sown, and no green leaf, or, indeed, anything but the bare ground, is perceptible, then there is every reason to hope that the operation will be attended with success. Should a few torn leaves or blades of wheat be perceptible, it will not matter, provided that the plants themselves are not torn up. After a lapse of eight or ten days, if the weather is favorable, the plants will be seen to shoot up afresh, and the field will present a much better and greener aspect than it did before the operation. The farmer may be pardoned for anything but the omission of performing this operation at the most favorable and propitious moment. Everything else should be set aside for the time being, in order that all the teams may be brought to work in harrowing the wheat fields."

The best farmers concur in this. The *Cultivator* says: "It has always been attended with good results, providing the ground was sufficiently dry at the time, and a light, fine-tooth harrow was used." The young wheat plants will appear to be roughly treated, but few are torn out. Drilled plants defy the harrow. The "propitious moment" in this country for harrowing is in April, when the surface is dry and cracked open. Clover-seed should be sown immediately after the harrow, and be rolled in before any rain has fallen.

When the growth is luxuriant, decided benefit has attended feeding off the wheat.

on the field early in the Spring when the ground is firm.

Time of Cutting.—Wheat is usually cut too late. It should be cut while the grain is in the dough and the tips of the chaff are green. THAYER says: "Wheat which is intended for sale should be cut before it comes to full maturity, otherwise it assumes a dusky appearance, and does not yield such white flour. Besides, wheat is always disposed to shed its seed; in dry, windy weather there will be some danger of a great deal being wasted if the crop is allowed to get too ripe. The exact period at which the harvest should be commenced must, therefore, be carefully chosen, and that has arrived when the grain has formed its farina, ceases to be milky, and yet has not hardened." A variety of experiments in England, with grain cut at the three different stages of maturity, "in the milk" (green straw), "in the dough" (lower half of stalk yellow), and "ripe" (straw yellow), resulted as follows:

No. 1. Cut when in milk, seventy-five pounds flour; seven pounds shorts; sixteen pounds bran.

No. 2. Cut when in dough, eighty pounds flour; five pounds shorts; thirteen pounds bran.

No. 3. Cut when fully ripe, seventy-two pounds flour; eleven pounds shorts; fifteen pounds bran.

When cut *too green*, grain is likely to shrink, but JOHNSTON, in his *Agricultural Chemistry* insists judging from experiment, that "when cut *a fortnight* before it is ripe, the entire produce of grain is greater, the yield of flour is larger, and of bran considerably less, while the proportion of gluten contained in the flour is larger."

A correspondent of the *Western Farmer* writes: "The last number of the *Farmer* contains an article, taken from the *Farm and Fireside*, in which an account is given of a farmer's experience and loss, consequent upon cutting his wheat in the milky, or incipient dough state. All this may be quite true, yet if the facts were given, I apprehend it would be found that this unfavorable result grew out of the failure of the rakers and binders to keep up with the reapers. The stalks of green or unripe straw are filled with sap, vigorously tending upward to complete the growth of the kernel, and if allowed to remain in the swath even for a few minutes under a scorching sun, the flow is arrested, the stalk is dried, and for lack of sustenance the soft kernel shrinks; whereas if the grain had been immediately bound, put into round shocks and cross-capped, the operation might have proved successful."

The Best Mode of Cutting.—The statistics relating to farming machinery, in the census report for 1860, furnish the experimental opinion of the American farmers. The value of such machinery, in 1850, was \$6,842,611, and in 1860, \$17,862,514, an increase of 160 per cent. A large part of this machinery was the reapers. In the last ten years they have been introduced into every portion of the wheat region, but especially in the Northwestern States, where the scarcity of labor and the increased wheat production rendered their aid indispensable. Even if they were no speedier than the cradle, the fact that it substitutes horse-power for human labor, is sufficient to insure their general use, for in this way harvest labor is doubled, and therefore the harvest crop may be doubled. The reaper is one of the leading causes of the increased aggregate wheat product of the country.

The subject of reapers, rakers, binders, etc., is elsewhere treated. It will be found safe never to purchase a reaper until you have tried the identical machine you intend to buy, if this is practicable. Reapers of the same manufacture will not work equally well, therefore try different ones, until you get one that will do the work well and fast. When you have a reaper keep it in repair, and if you are not capable of doing it yourself, put it in charge of a man that is.

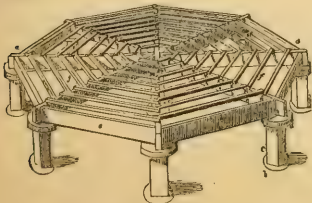
The power and wealth of Great Britain consists in its vast machinery. With a population of 29,000,000, it uses steam-power equal to the labor of 600,000,000 of men. We have grown great by the use of labor-saving machinery in our manufactures and transportation, and the more it is applied to agricultural pursuits the cheaper production will become, and, as a consequence, the more will be raised and consumed. All that is needed now is a good binder-attachment, and we trust this may be soon realized.

Putting in Shocks.—Large fields of wheat are often seen thrown together, two and two, and then, in consequence of the hurry and scarcity of hands, the grain is allowed to remain for weeks, and unless a man is employed to go over the ground after every blow or rain, it must damage to a considerable extent, for the heads can not remain long lying on the ground without growing. By wetting and drying a number of times it becomes bleached, the head shrivels, and the grain loses its vitality—called among farmers being "banged." Grain of all kinds, and more particularly Spring wheat, should be put in round shocks and capped with a

double cap. Commence by setting four bundles in a square, and then four more, one in each corner, and then four more, setting the butts firm on the ground and pressing the heads together. Select two smallish, long, slim bundles, break one across one arm by handfuls until the whole is broken. Then lay it on the shock, spreading the heads and butt as much as possible. Then take the other bundle and slip the band well towards the butt, and proceed as before, placing the heads in the opposite direction from the other, letting the heads cover the bands of the first one. Wheat shocked in this way will stand a long time, and any storm, except a hard blow, without damaging. Wheat cut very green will cure in this way as all the bands are left to the air. The oblong shocks, made by setting ten sheaves in a double row, are no adequate protection in wet weather.

Stacking.—Stacking is generally regarded in this country, especially in the Middle and Eastern States, as an unfortunate, because wasteful, expedient; but in England, even with its snug farming, and moist atmosphere, many of the wisest farmers prefer stacking grain to storing it in barns, contending that the former custom is attended with less loss. In our Western States stacking out is the rule with all large farmers, because crops are heavy, barns expensive, and the huge iron thrasher must have room according to its strength.

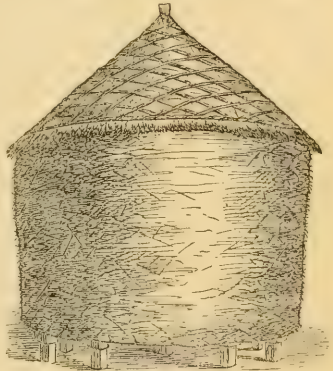
In England, stacking is done on scientific principles. Instead of throwing up the grain loosely, in an awkward pile, on the frozen ground, exposed to rains and rats, they build on a shapely platform of stone, iron, or wood, elevating the grain a foot or two from the ground, and then the whole stack is so firmly constructed and so completely thatched, that the grain will keep dry and sound for years. The accompanying cut represents the octagonal stathel or "corn-stand" much used in Great Britain.



A WOODEN STATHEL FOR STACKS.

The engraving explains itself. The general

introduction of this platform into this country may not be at present practicable, because grain is thrashed so soon after harvesting; but in a few years something like it will, in particular cases, be demanded. We also append, with the same confident anticipation of its future usefulness, a picture of an English grain stack, showing the lozenge mode of roping on the thatch.



AN ENGLISH STACK.

It requires about as much ingenuity, care, and skill to build a good stack, as to do well any other piece of farm-work. The best way is to learn the theory, and then take a lesson from an adept. The following is the theory, as practiced by English farmers; it can not be much improved upon. It is from the pen of HON. JOHN Y. SMITH, long editor of the *Wisconsin Farmer*:

"First: as to the foundation. It is the best plan to raise it about a foot from the ground by setting short posts in the earth, or sawed blocks or stones upon the surface, sufficiently large to make it firm, and laying a floor of strong rails. It will give a circulation of air under the stack and the cats a chance to keep it free from mice, rats, gophers, etc. At any rate, there must be a foundation of wood sufficient to keep it from acquiring moisture from the earth. This done, commence in the center by setting up sheaves as for a round shock, adding course upon course, setting the butts of each succeeding course a little more out so as to have the outside course at about the angle of a quarter-pitch roof, being careful to force the butts down between the rails so they will not slip and flatten down as weight is added.

"Let this last course in working from the

center, serve as the first course in the layer which you make back to the center, laying the butts of the next course about even with the bands of the course under it, and thrusting the butts of each bundle, as you lay it, into the bundle under it, to prevent its slipping outward by pressure. Go round with a single course, keeping your work before you and pressing down the bundles with your knees. Then lay another course in the same manner, lapping at the same place, and so on till you get to the center. Then commence again at the outside, laying the butts of the first course even with those of the lower course, or projecting a little over, being careful as before to catch the butts of the new course into the lower one, and work inward as before.

"The outside should be as little pressed as convenient, in building, and the inside packed as close as possible, so that the pitch of the bundles outward will be increased rather than diminished as the stack settles. If the heads of the bundles do not keep up the pitch of the sheaves equal to that of an ordinary roof, put in extra sheaves enough to do it, in any way which will keep the surface regular in form. The butts of each outside course should project a little over the course below it until you are ready to draw in, so that the stack, when done, will have the shape of a hen's egg, a little flattened at the large end. A little marsh hay makes a good cap, which should be secured against the winds by ropes made of the same, placed over the top and held by weights at the sides."

A stack may be ventilated as shown under the head of stacking hay.

Thrashing and Cleaning.—Hardly any work is so much dreaded by the large farmer as thrashing; partly, perhaps, because there are so many slovenly, lawless thrashers. One experienced thrasher who has the faculty of keeping his machine in repair, is worth more to a farming community than six of the opposite stripe.

A correspondent says in the *Prairie Farmer*: "Thrashing should never be done until the stacks are through sweating. Stacks after standing one week, commence sweating and continue to sweat about two weeks, so that it is not safe to thrash until the stacks have stood for about four weeks. Wheat thrashed while sweating is sure to be damp and liable to must in the bins; but thrashed after the sweating process is over, it is better for milling than when thrashed before, from the fact that the bran is softer, and the flour is easier separated

from it, thus giving a better yield, and whiter flour. Should your wheat be damp, and it be necessary to put it in bins without drying, avoid the foolish practice of putting in lime to absorb the moisture. Throw in a few stones or bricks, which will draw the moisture from the wheat, having the same effect as the lime, and leave the grain clean and smooth; which will please the miller much better than lime and rough dirty wheat. To clean it of smut for seed, roll in lime for twenty-four hours, which will burst the smut-balls; then you can blow them out with a good mill."

Another point is to be considered: whether it is better to employ an eight-horse-power thrasher, or the smaller two-horse-power—for the flail is generally obsolete. The eight-horse-power machines are now mostly used, but there are many considerations favoring the smaller in localities where the wheat crop is not very large. The time between the hay harvest and wheat sowing is generally employed in thrashing, and a number of neighbors associate together sufficient to attend the larger thrasher. This is in the most oppressive part of the year on account of heat, and the strength of the farmer is exhausted by the labor of the harvest. It interferes with plowing for the wheat crop, and the August rains can not be taken advantage of for this purpose. If farmers generally had a two-horse-power the thrashing could be done after the wheat crop was put in.

It can not be necessary to say anything about the folly of sending grain to market in a half-clean condition; if any farmer has not yet learned its unprofitableness, experience is a cheap enough teacher for him.

Marketing.—An intelligent correspondent says, "Marketing wheat successfully depends very much on the locality in which the farmer is situated, and the facilities for getting to market. Obstacles are often thrown in the producer's way by the grain speculator, such as raising the bids for a day or two, so as to get a large quantity coming into their place of buying, and then bidding down below all reason. In towns where that practice prevails, watch all their moves, and when your suspicions are strong enough to warrant it, call on the sealer of weights and measures. Still, that is of but little use, for as soon as he is gone the scales are out of balance or the measures are exchanged for others to suit the trade. Many ways are resorted to, to pilfer from the honest unsuspecting farmer. Some of these I have detected in my experience, and will mention. Every

farmer that goes to market should know his own weight, and before his wheat is weighed step on the scales, see that they are balanced and weigh rightly, for scales are so constructed that a slight move will throw them in the buyer's favor—that is one practice. Again a set of false weights is sometimes kept and slipped on slyly. A sixty pound weight is sometimes placed under the large ones. The grain dealer will spill a small quantity and forget to put it back. If measured, fix your eye on some mark on the half bushel so as to know it, and see that it is not changed. Farmers that raise wheat enough to do so should send by the carload, or cargo, to some commission merchant in a large commercial town, say Chicago, Milwaukee, or Buffalo, and consign their wheat to him as long as he is doing a large business, for be assured, that when a large number of his customers have left him, there is something wrong, and the less business he does the less he can afford to be strictly honest."

How to Measure a Ripening Crop.—This is the English mode: A day or two before cutting, adjust four fine sticks in a light square frame, like a slate frame, enclosing exactly one foot; go with this to your field, and lower it carefully over as many heads of grain as it will cover; then cut and shell the grain enclosed, and weigh it. Multiply the weight by 43,560, and it will give you, approximately, the weight of the acre's yield. Repeat the experiment half a dozen times to confirm the result.

To Measure Grain in the Granary.—Divide the cubic feet by 56, and multiply by 45, and the result will be bushels, struck measure.

The Average Price of Wheat.—Wheat started in Albany, New York, at seventy-five cents a bushel in 1793, but it has never touched that low figure since, though in 1821 it stood at seventy-seven, and in 1845 at ninety-three cents. Six times in the sixty years following 1793, it rose to two dollars a bushel in that city. The average price for the whole period was one dollar and thirty-eight cents; and for the last twenty-five years it has been one dollar and twenty-five cents. The price in Chicago for twenty years has ranged from forty cents to one dollar.

Rust.—Rust, or mildew, is a most destructive enemy of the wheat crop. It seems to be always lurking in the field, waiting for favorable circumstances to outspread and devour the harvest. It flourishes in close, hot, damp weather. It consists of a breaking of sap from the straw, and the formation of a rusty crust. The dis-

ease is produced by a minute fungus, whose roots penetrate the vessels of the plant. There is no remedy known; partial preventives are believed to be the selection of hardy varieties; sowing on high lands; early sowing; and the free use of lime, salt, charcoal, and plaster, instead of barn-yard manure. JOHNSON'S Farmers' Encyclopedia says: "Salt, if not a complete preventive, is an effectual cure of the mildew." This statement is to be proved before being completely credited; in the meantime, farmers will probably go on and harvest their grain at once, whenever rust makes a vigorous attack.

A correspondent of the *Country Gentleman* maintains that "sowing timothy or clover with wheat causes rust and blight, by keeping the straw moist near the ground till the hot sun comes upon it. If grass is to succeed wheat, he is very decided that it should be sowed in the Fall, after the wheat is removed.

Smut is a blackish parasitic plant, akin to the rust fungus. It attacks the head of grain. The cause is unknown. Wet seasons, fogs, animalcules, exposure to intense sunshine when moist, deficiency in the organs of generation, and other conditions, have been assigned as primary causes, but they are probably merely contingencies which aggravate the symptoms. The only known remedy for this is to wash the seed before sowing, in two or three strong brines, and then roll it in quicklime. A Wisconsin correspondent of the *American Agriculturist* recommends the following: "Take one pound of blue oil of vitriol—dissolve it in two or three quarts of boiling hot water, in some earthen vessel. Then put it in a pail and fill with cold water. Now take ten bushels of seed-wheat on the barn floor, and sprinkle this solution all over it, and shovel it thoroughly, so that every kernel is wet, and in two or three hours it is ready to sow."

Willow.—The osier or basket willow can hardly be made a general field crop in America, but it ought to be raised more than it is, as it grows on low lands, where little else will grow, needs no culture, and nets fifty to one hundred dollars per acre. In England and Scotland it produces an annual crop worth one hundred to one hundred and fifty dollars an acre, with a small outlay of capital or labor. It is worth in the New York market from one hundred to one hundred and fifty dollars a ton, and yields more than a ton to the acre; the supply is derived mainly from France and Ger-

many, and amounts to five million dollars annually, with an increasing demand, which the importations, large as they are, fail to fully supply. It is just as easy, and equally profitable, to grow this, or any other variety in the United States, as in Europe; besides we have here millions of acres lying idle, which might be appropriated to this purpose. There is not the least doubt that basket willow enough to supply the world can be produced in this country at fifty dollars a ton, and pay a better profit to the cultivator than he can get from wheat, corn, or hay.

An American farmer thus describes a crop grown by him in swamp land: "We had beds thrown up with the spade, about four feet wide, running across the enclosure—the ditches being about two feet wide and two deep, between the beds—each bed having two rows of osiers, planted, one near each outside. The weeds were kept down with the hoe till the young plants got strong, after which they fully occupied the ground, smothering everything else. These were sold at auction, and made from \$25 up to \$75 per acre, according to the crop, the purchasers taking them away at their own expense—the best beds selling for the latter sum. I have seen osiers on a twenty-acre piece of low clay land (which could not be devoted to any other purpose), planted in beds as stated—the ditches between the beds having water in them nine months out of the twelve—and these have been sold at a much higher rate. On the piece alluded to all that was done was the shoveling out of the ditches after every cutting, and laying the sediment and any soil worked down in the getting off of the osiers, on the beds among the stumps from which the crop had been cut.

Manure, or any application besides, would be thrown away, and any cultivation after the first year would do no good, because in a well-planted osier bed nothing else can possibly grow."

The osier willow is worthy a place on every farm, because it takes up very little ground, requires very little care, and furnishes the best materials for baskets, which are indispensable to the farmer. This, like all the willows, is readily propagated by cuttings. Where it has taken good root, its shoots, in good ground, grow from four to eight feet in a season. These shoots should all be taken off every winter, unless very large willows are wanted, and the number is thereby annually increased. The art of fabricating baskets from them is easily acquired, and may be practiced in evenings and stormy days in the Winter without cost. For ordinary baskets the osier is used with the bark on; but for neat house baskets they are peeled. The best way to divest them of the bark by hand is to cut, sort, and tie the osiers in small bundles, say early in March, and place the bundles in a pool of stagnant water; and at the season the leaf buds are bursting, the bark will readily strip off. The osiers may then be laid up to be used when leisure will permit. The most serious drawback to the raising of the osier is the peeling. It now costs forty dollars a ton to peel it, when it ought to cost but ten dollars.

A large amount of this willow is raised upon the estate of the late Colonel COLT, of Hartford, Connecticut, where the Swiss artisans have a picturesque little village of Swiss houses, and a manufactory that furnishes fancy baskets to the New York market.

THE GARDEN:

VEGETABLES, FLOWERS, SHUBBERY, AND LAWN.

SINCE the time when our first parents planted and dressed the Garden of Eden, the culture of vegetables has received a large share of the attention, and contributed a large portion of the sustenance and happiness of every family of the civilized world.

The origin of some of the principal vegetables, fruits, and cereals deserves a brief notice. Beans blossomed first within sight of embryo mummies, in the land of the Sphinx; and the egg-plant first laid its glossy treasures under the African sun, and Southern Europe gave us the artichoke and the beet. To Arabia we owe the cultivation of spinach; and to Southern Europe we must bow in tearful gratitude for the horse-radish. What fair school-girl, of the pickle-eating tribe, dreams of thanking the East Indies for her cucumbers?

Parsley, that prettiest of all pretty greens, taking so naturally to our American soil that it seems quite to the manor born, is only sojourner among us. Its native home is Sardinia, or, rather, there it first secured an acquaintance with civilized man. Onions, too, are only naturalized foreigners in America. Perhaps this pathetic bulb ought to have sprung from the land of NIOBE, but no; Egypt stretches forth her withered hand and claims the onion as her own! The garlic came from Sicily.

Who ever dreams, while enjoying his Bergamotte, his Flemish Beauty, or his Jargonelle, that the first pear-blossoms opened within sight of the Pyramids? To Persia we stand indebted for peachês, walnuts, mulberries, and a score of every-day luxuries and necessities—the luscious peach having had its origin in the bitter almond. The chestnut, dear to squirrels and young America, first dropped its burrs on Italian soil.

Wheat had its origin in Asia. At Siberia, the victims of modern intemperance may shake their gory locks forever—for from that cold, unsocial land came rye, the father of that great

fire-water river which has floated so many jolly souls on its treacherous tides, and engulfed so much of humanity's treasure. Maize and potatoes, thank heaven! can mock us with no foreign pedigree. They are ours—ours to command, to have, and to hold, from time's beginning, to its ending, though England and Ireland bluster over “corn” and “praties” till they are hoarse.

It has been well said, by a cultivator of large experience, that, as a part of rural and domestic economy, the garden should claim a share of the farmer's attention. Whether the number of his acres be few or many, it is policy to devote a choice corner to the cultivation of such roots, herbs, plants, and fruits as please the taste and add to the delicious stores of the kitchen. The care of a garden need not necessarily tax the time of the farmer; for much of the labor can be performed by the younger members of the family, while the odds and ends of time, that every one will have more or less of, will be quite enough for the remainder.

To remunerate cultivation, however, it must be kept in order and free from weeds, for it never refuses to honor all drafts properly made upon it. We expect more than ordinary results, but unless we give it more than the care ordinarily bestowed on the crops of the farm we must be disappointed. And here it is, one may see high cultivation epitomized, and learn that if we will extend equal care to all the land we cultivate, we shall be equally rewarded with high crops. All soils are not alike adapted to gardening purposes. By carefully noticing their faults, and pursuing a judicious course to correct them, there are none but may, in very few years, be brought to the highest state of gardening tilth.

Who, having once realized the comfort and benefit arising to the health of the family, to say nothing of the gratified taste, would forego the well-filled and well-cared-for garden? As

it greatly economizes the staple products of the farm, it is really, aside from all the other inducements, a matter of pecuniary profit.

Let those who have not yet done it, get a garden, bring it to the highest state of tilth that time and circumstances will permit; secure it from all encroachments of vicious pigs and other unruly creatures, and they will find it just the place for currants, gooseberries, raspberries, strawberries, etc.—for every one with a trifle of pains, can have an ample supply of all these delicious fruits. And then at the proper time, let them put in the early and late peas and beans, the sweet corn, the beets, parsnips, salsify, onions, radishes, lettuce, cucumbers, melons, squashes, tomatoes, pie plants, etc.

The garden is a school. The education gained there is never forgotten. It is a nursery of health, of happiness, and of good and simple and natural tastes. An enthusiast, but none the less an excellent judge, the PRINCE DELIGNE has said: "It seems to me that there is not a virtue I could not attribute to him who loves to speak of and to make gardens. Fathers of families inspire your children with the love of gardening."

Much of the attractiveness of the garden depends on the taste displayed in laying out the ground, as well as in its general culture. Landscape gardening is calculated to combine beauty with profit. RICHARD DAVIES, a landscape gardener of twenty-eight years' experience in a communication to the *Western Horticultural Review*, makes these practical suggestions: Improvements may consist in laying out a new place, or in making alterations in the arrangements of old grounds, such as altering the direction and form of roads and walks, and the making of new shrubberies and plantations, or changes in those which already exist; the addition to, or contraction of, the pleasure-grounds; the removal of trees and shrubs, and the alteration and re-arrangement of the flower garden. Varying the curve of a walk, removing or altering the shape of a flower-bed or clump of trees or shrubs, or any similar change, can only be an improvement when made in conformity to taste. In the laying out and alteration of grounds, there is ample scope for variety within the wide boundary of acknowledged and consistent taste.

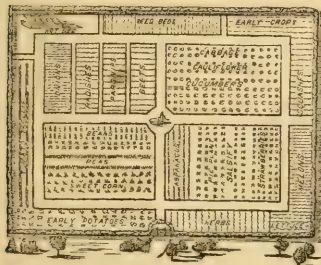
In many places, much improvement could be effected by giving carriage-roads and walks more easy and graceful curves, as well as in keeping them in better order. Where walks from long use and frequent rolling have be-

come too low, and where the introduction of gravel to raise them is expensive, a great improvement may be made, if the ground will admit of it, by cutting and rolling up the sod for one, two, or more yards from the side, and removing as much soil as will bring the sod, when replaced, not more than an inch and a half above the gravel. Few things are more insipid in garden scenery than perfectly straight walks and roads, unless when they assume character and dignity from contiguity to, and connection with, the straight line of a house, veranda, greenhouse, avenue, etc. In forming a carriage-road or walk, the great object is to make a means of communication between two different places; and the chief rule to be adhered to, where a straight line would not be desirable, is to render the curves graceful and easy, never introducing a bold, abrupt curve, unless there is a seen and felt reason for doing so, in the presence of an obstruction, either existing previously, or placed there by you, to convey that impression, and thus alone, in such circumstances, to call forth feelings of pleasure, and the perceptions of the beautiful, because associated with the stern demands of necessity.

We must have some standard to judge of the beauty and deformity of objects. If geometrical gardens are distinguished for undisturbed repose, those of an apparently irregular outline require something exciting. This effect can be produced by planting in clumps, trees and shrubs of different forms. There are of trees, as of every thing else, some absolutely beautiful, others relatively so; some are adapted to make a figure of themselves, while others appear to advantage only in contrast, and are consequently best seen mixed in clumps. A definite purpose should characterize all that we do in pleasure-ground arrangements; whether it be limiting the growth of the tree or shrub to the size of the figure, or allowing it to extend beyond the regular line first marked out in picturesque scenery, it matters not. In planting clumps, we should select trees of different forms, choosing the round-headed for definite turns, but taking care that irregular-shaped ones are placed not in the center exactly—though there occasionally they may be wanted—but nearer the outside of the clump, and just by the regular trees, so as to contrast with the latter, and break up the monotony that would otherwise prevail. But this may be advantageously relieved by planting separate and peculiar trees near the clumps, so arranged as to mass with them in certain directions, but

appearing distinct from them when viewed from other points, whence they may show to advantage by way of contrast.

The following cut, from the *Country Gentleman*, represents a good plan for a kitchen garden, spaded or entirely worked by hand; it may be enlarged, or reduced in size, according to circumstances:



Trenching Gardens.—One of the most important operations for the good gardener to perform before the Winter frosts set in, is to trench-plow, or spade in his garden. This ought to be done at least eighteen inches deep—two feet would be still better. Such parts of the garden as are enclosed by gravel walks, or small plats, or encumbered by shrubbery or plants, must be spaded—a long-bladed trenching spade, in connection with the common spade, will be essential for the purpose. First with the common spade trench or dig the ground, from one end of the plat to the other, about ten or twelve inches deep; and then follow with the trenching spade, about ten inches deeper. Be careful to leave this undersoil in its rough state on the top, to be pulverized by the Winter's frost, and enriched by the snows and rain.

Coarse manure should always be dropped on the bottom of each trench, also on the top of the plat, as fast as three or four feet in width are spaded. Thus the top and bottom will be undergoing an enriching process at the same time, and by Spring will form a first-rate garden soil of twenty to twenty-two inches deep. By adding bone-dust, ashes, guano, or anything else needed by the soil, and re-spading about twelve inches deep in the Spring, the gardener will seldom fail to produce the best of vegetables, fruits, and flowers. By thus applying the manure in the Fall, it will become by Spring the proper food for plants, and will not burn up the crops, as freshly applied manures in

Spring often do, when the heat of Summer comes on.

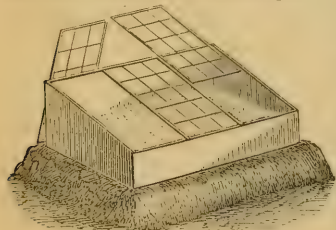
Some gardens are adapted to the use of the trench plow. Some plows of this construction have a share and mold-board narrower than those of the surface plow, with a high standard and arching beam—with over twenty inches from the beam to the point of the share. By the trench plow following the common plow, soil to the depth of twenty inches can be turned up well.

Without deep trenching or plowing some gardens will suffer greatly during every dry Summer; but when the earth is turned up to the depth of eighteen to twenty inches, a severe drought will scarcely affect it. Something is doubtless due to the amelioration of the soil, but still more to the deep stirring the ground has received. This extra labor is well repaid by the increased product, as well as by enhancing the certainty of the crop.

As the subject of manures and composts has been specifically treated elsewhere in this work, a single suggestion only on this head, and its relation to the garden, need here be noted—and that simply with the view of adding line upon line, and precept upon precept: No manure need be bought for the garden, and every place can have a full supply of the best in the world by observing the following rules: Have a sink, or large water-tight box under the privy, and into this, throw muck, charcoal bottoms, or any kind of absorbent; having running into it a conducting pipe, or gutter from the kitchen, that all waste-water, chamber-ley, and soap-suds, may be run into this sink, saturating the dirt and coal bottoms completely, and disseminating among it the privy manure; then empty it out once or twice a week. If a portable box is made for the sink upon wheels, it will be found to add much to convenience and save handling. It should be large enough to hold one or two cart-loads. This process makes the best manure in the world and the cheapest. Any ordinary family can make seventy-five to one hundred and fifty loads of this manure per annum, by attending to this simple process. The gardeners around New York and Philadelphia have found privy manure by far the best; in some instances spreading it over the surface of the ground from buckets, for which they buy thousands of loads, and it invariably produces the largest vegetables, and the greatest growth of plants. An ordinary family, and the waste from an ordinary house, can make as much manure under this process as can be made by five

horses. To get a great growth of plants, watering with liquid manure produces the largest results. In order to obtain this conveniently, bore holes in the sides of a barrel, and set it in the corner of your sink, or have a drain from one corner of your sink into a barrel.

The Hot-Bed.—No garden is complete without a hot-bed, in which to raise early tomato, cabbage, cauliflower, celery, cucumber, squash, melon, and egg-plants, together with early lettuce and radishes. It should be made in the latter part of March, or beginning of April, varying, however, a week or two—or even more—according to the difference in climate and latitude. The following figure of a hot-bed, on a small scale, may aid those who have had no experience in constructing one :



The first thing to be provided will be a quantity of manure sufficient for the bed—one four by eight feet in size would be of very moderate dimensions; and for such a bed, three two-horse loads of horse manure would be requisite. Deposit this in a loose heap convenient to the selected spot, permitting it to remain a few days for fermentation before it will be ready for use—if composted with leaves, or spent hops all the better. Horse manure has been indicated as preferable to any other on account of its heating properties—that which has not been burned out, nor that which has had too much bedding mixed with it.

Make the frame-work of your hot-bed with inch boards, or inch and a half plank—pine answers best, as it does not warp readily; and put them together in box form, the size of your contemplated bed—and placed facing the south, six or eight inches high in front, and about twice as much in the rear. This slope will carry off the rains from the sash-glass; the sash should have no cross-bars, or if common sash is used, cut down the cross-bars so as to let the panes lap over like shingles; and provide grooves on the upper side of the frame, to allow

the sash to slide freely, for opening in warm weather, and closing at night, or when the weather is cold. Coat the frame with crude petroleum, using gas tar, if convenient, for the inside where it comes in contact with the earth, or a coat or two of paint, if petroleum can not be had.

It is time to make the bed when the steam begins to rise from the manure heap. Some prefer to dig a pit, the size of the designed bed, where there is thorough natural drainage to the subsoil, and fill it with the manure; while others prefer to make the natural surface the basis on which to build their beds—placing the manure in even layers over the whole surface, till they reach a height of two and a half or three feet. Keep the interior of the bed well beaten down with the manure-fork when spread in each successive layer, and tread the outside with the feet to render it sufficiently compact—otherwise the outside will settle most, and the bed will crack open in the middle. When the whole is completed, put the frame in its place, as shown in the figure, and close the sash till the heat begins to rise, which can readily be ascertained by thrusting the finger down into the manure. Then fill in about six or eight inches of the best, cleanest, richest mold—that taken from an old rich pasture is better than from the garden, inasmuch as the latter, if a long time in use, is apt to contain eggs of destructive insects which are hatched by the heat of the bed—and if this contain a small percentage of clay, and be composted with one-third of well-rotted leaf mold from the forest, it will be all the better.

When this bed becomes warm, in a day or two, which the steam condensing on the glass will indicate, the seed may be sown in rows north and south. Of cucumbers, it has been suggested, if planted on pieces of decayed inverted turf, the plants may be removed with the turf, to the open ground; or, if planted in the corners or middle of the bed, they may be permitted to remain and grow without removal. Radishes do best in nearly clean sand, which should be provided for that part of the bed set apart for them.

As soon as the young plants are up, care must be taken to give them plenty of air, but not to chill or freeze them. Open the sash more or less, according to the condition of the weather. Be particularly careful not to leave the sash closed when the morning sun comes out upon the glass, as the air within is heated with great rapidity while thus confined, and

the plants are easily scalded or killed. If a very cold snap occurs, throw a blanket or mat over the glass. A liberal supply of water of a moderate temperature must be given to the plants while growing in the bed—rain water is the best.

Another mode of making a hot-bed has been recommended by one who has tried it: Take quick, or unslaked lime, reduced to small lumps or as fine as you please. It should be *well* burnt. Then prepare a place for your bed, by spading or excavating the soil to the depth of four inches; or shallower or deeper, as you may wish to continue the effects, shorter or longer. Fill this nearly full with the lime; and cover it over sufficiently deep with soil or loam, of the ordinary moisture. In this, plant what you design for your bed. The value of this kind of hot-bed consists in the evolving of heat by the gradual slaking of the lime. The moisture necessary for the plants will be sufficient for this. The degree of heat, too, will be much greater than what can be procured by the decomposition of fresh manure, or any other means with which the writer is acquainted. Be careful in watering not to put on too much at a time; as this may increase the heat too much, so as to be injurious, and by the rapid slaking of the lime exhaust the supply too soon. Sweet potatoes have been bedded in this manner, and very early slips or plantings produced; but they require a deeper layer of soil over the lime, and a thicker covering, than smaller plants.

It may be well to give the manner of constructing hot-beds in Germany: Take white cotton cloth, of a close texture, stretch and nail on frames of any size you wish; take two ounces of lime water, four ounces of linseed oil, one ounce of white of eggs, two ounces yolk of eggs, mix the lime and oil with very gentle heat, beat the eggs well separately and mix them with the former; spread the mixture with a paint brush over the surface of the cotton, allowing each coat to dry before applying another, until they become water-proof. The following are the advantages this shade possesses over a glass one: 1. The cost being hardly one-fourth; 2, repairs are easily made; 3, they are light. They do not require watering; no matter how intense the heat of the sun the plants are never struck down or burnt, faded or checked in growth—neither do they grow up so long, sick, and weakly as they do under glass, and still there is abundance of light; 4, the heat arising

entirely from below is more *équable* and temperate, which is a great object. The vapor rising from the manure and earth is condensed by the cool air passing over the shade, and stands in drops on the inside, and therefore the plants do not require so frequent watering. If the frames are large, they should be intersected by cross-bars about a foot square, to support the cloth. These articles are just the thing for bringing forward seeds in season for transplanting

Purity and Vitality of Garden Seeds.—As success in gardening depends much on good seeds, a few hints on raising, gathering, and preserving them, may be of importance. Plants intended for seed should be carefully cultivated during their whole existence, and especially while their seeds are ripening. They should be located in such a manner, as that those of the same species can not intermix and produce deteriorated varieties. To prevent mixing, they must be set at considerable distances apart, as even Indian corn has been known to mix at the distance of three hundred yards. It is utterly impossible to preserve varieties of cucumbers, melons, squashes, pumpkins, etc., in their purity, if they are permitted to flower and ripen their seeds in the same garden—the seeds of two varieties of the same species of plants should not, therefore, be raised in the same garden at the same time. It is this disposition to mix and degenerate that renders it difficult for seedsmen to raise a complete assortment of seeds on their own grounds, unless they are very extensive.

The most luxuriant and perfect plants, and such as arrive at maturity the earliest in the season, should be selected for seed. They should be permitted to remain in the garden until the seed is perfectly ripe; and should then be gathered and cleaned in clear weather. If any moisture remain, they should be exposed to the rays of the sun until they are perfectly dry, and then be put up in bags or boxes, and secured from the depredations of rats, mice, and insects, and the action of severe cold. As a general rule, new seed is to be preferred to old, on account of its germinating quicker and producing a more vigorous growth; but good seeds, gathered and preserved in the foregoing manner, will retain their vitality about as follows, and even much longer, in many instances, if kept in strong paper bags of fine texture, and well pasted, so as to exclude the air:

SEEDS.	YEARS.	SEEDS.	YEARS.
Anise	3 to 4	Mangel Wurzel....	5 to 10
Asparagus.....	3 to 6	Marjoram	3 to 4
Artichoke.....	5 to 6	Melons	3 to 10
Balm	2 to 3	Mustard	3 to 4
Basil.....	2 to 3	Nasturtium.....	2 to 4
Beans.....	2 to 3	Okra.....	2 to 6
Beets.....	5 to 10	Onion.....	2 to 3
Broccoli.....	4 to 6	Parsley.....	3 to 4
Cabbage.....	4 to 5	Parsnip.....	2 to 3
Caraway.....	2 to 3	Pea.....	3 to 5
Carrot.....	2 to 4	Pepper.....	2 to 4
Cauliflower.....	4 to 6	Pumpkin.....	5 to 10
Celery.....	4 to 5	Radish.....	4 to 5
Coriander.....	1 to 2	Rhubarb.....	2 to 4
Corn.....	3 to 8	Rue.....	2 to 3
Cress.....	2 to 3	Ruta Baga.....	3 to 5
Cucumber.....	5 to 10	Sage.....	2 to 3
Dill.....	2 to 3	Salsify.....	2 to 4
Egg-Plant.....	2 to 4	Savory.....	3 to 4
Endive.....	2 to 5	Sea Kale.....	3 to 4
Fennel.....	3 to 4	Spinach.....	3 to 5
Garlic.....	2 to 3	Squash.....	5 to 10
Gourd.....	5 to 10	Sweet Marjoram.....	2 to 3
Hyssop.....	3 to 4	Thyme.....	2 to 3
Lavender.....	2 to 3	Tomato.....	3 to 5
Lettuce.....	2 to 4	Turnip.....	3 to 5
Leek.....	3 to 4	Wormwood.....	2 to 3

Some gardeners prefer old seeds of cucumbers, melons, squashes, etc, to new, on account of their running less to vines, and producing larger crops of fruit; but on this point we can not speak with certainty. The vitality of seeds is easily tested, and they ought never to be sown in any considerable quantity without it. When divested of their covering, such as will germinate will sink in lukewarm water, while such as have lost their vitality will float on the surface.

Time Required for Seeds to Germinate.—According to LOUDON, the length of time necessary for the following seeds to germinate, may be thus stated—subject, of course, to many variations by different degrees of heat, moisture, and general condition of the soil: Wheat, one day; beans, mustard, and spinach, three days; lettuce, four; beets, cress, cucumber, melon, and radish, five; barley, seven; purslane, nine; cabbage, ten; parsley, forty; almond, chestnut, peach, one year; filbert, hawthorn, and rose, two years.

Quantity of Garden Seeds to Plant.—The following table may be found useful for reference:

Asparagus.—One ounce produces one thousand plants; requires a seed-bed of about twelve feet.

Asparagus Roots.—One thousand plants, bed four feet wide and two hundred and twenty-five feet long.

Beans.—One quart plants, from one hundred to one hundred and fifty feet of row, or one hundred and fifty to two hundred hills.

Beets.—One ounce plants, one hundred and fifty feet of row.

Broccoli.—One ounce gives two thousand five hundred or three thousand plants, requiring forty square feet of ground.

Brussels Sprouts.—Same as broccoli.

Cabbage.—Early sorts same as broccoli; the later sorts require sixty feet of ground.

Cauliflower.—The same as late cabbage.

Carrot.—One ounce to one hundred and fifty feet of row.

Celery.—One ounce gives six thousand or seven thousand plants, requiring eighty feet of ground.

Cress.—One ounce sows a bed sixteen feet square.

Cucumber.—One ounce for one hundred and fifty hills.

Egg-Plant.—One ounce gives two thousand plants.

Endive.—One ounce gives three thousand five hundred plants, requiring eighty feet of ground.

Kale.—Same as broccoli.

Leek.—One ounce gives two thousand plants, requiring sixty feet of ground.

Lettuce.—One ounce gives seven thousand plants, requiring seed-bed of one hundred and twenty feet.

Melon.—One ounce for one hundred and twenty hills.

Nasturtium.—One ounce sows twenty-five feet of row.

Onion.—One ounce of seed sows two hundred feet of row.

Okra.—One ounce sows two hundred feet of row.

Parsley.—One ounce sows two hundred feet of row.

Parsnip.—One ounce sows two hundred and fifty feet of row.

Peppers.—One ounce gives two thousand five hundred plants.

Peas.—One quart of smaller sorts sows one hundred and twenty feet of row; of larger, two hundred feet of row.

Radish.—One ounce to one hundred feet.

Salsify.—One ounce to one hundred and fifty feet of row.

Spinach.—One ounce to two hundred feet of row.

Squash.—One ounce to seventy-five hills.

Tomato.—One ounce gives twenty-five hundred plants, requiring seed-bed of eighty feet.

Turnip.—One ounce to two thousand feet.

Water-Melon.—One ounce to fifty hills.

Qualities of Fine Vegetables.—In the blood-beet we always look for a deep color, smooth, handsome form, small top, and sweet, tender flesh. In the orange carrot, small top, smooth root, and deep orange color. In the cabbage, short stump, large, compact head, with but few loose leaves. In the cucumber, straight, handsome form, and dark green color. In the lettuce, large close head, pleasant flavor, with the quality of standing the heat, without soon running to seed. In sweet corn, long ears, very shriveled grains, filled over the end of the cob. In the cantelope melon, rough skin, thick, firm flesh, and high flavor. In the water-melon, thin rind, abundant and well-flavored juice, and bright-red core. In the onion, thick round shape, small neck, deep color, mild flavor, and good-keeping quality. In the parsnip, small top, long, smooth root, rich flavor. In the pea, low growth, full pods, large and tender peas, rich flavor. In the scarlet radish, deep color, small top, clear root, and quick, free growth. In the squash, medium size, dry, fine-grained, deep-colored flesh. In turnips, handsome form, small tops and tap root, sweet, crisp flesh.

In describing the vegetables and herbs of the garden, preferable kinds, and their proper modes of culture, botanical terms and mere theorizing will be deemed out of place, and will be omitted, as far as possible; and practical facts and suggestions will be considered alone worthy of attention.

Artichoke.—This is a hardy perennial. There are two kinds, and each kind has several varieties. The Jerusalem artichoke, the kind best known in this country, has a stem six or eight feet high, growing and flowering very much like the common sunflower—of which it is really a species. It is cultivated for its roots or tubers. The other artichoke, having something of the appearance of a gigantic thistle, grows four or five feet high, with numerous branches, and leaves of remarkable size, frequently measuring three or four feet in length, and producing heads on the stalk which, are used as an article of food among the English, French, and Italians.

The Jerusalem artichoke thrives best in a rich, mellow soil—if the soil be trenched fifteen or eighteen inches deep, it will much improve the roots. It is propagated by planting small tubers or offsets—large tubers may be cut into several pieces, giving an eye to each, as with the potato; and plant ordinarily in April, or

early in May, in rows three feet apart, and the tubers dropped a foot apart in the rows, and covered three or four inches deep. They will need hoeing, from time to time. Some gardeners, toward the close of Summer, cut the stems off about their middle, to admit more freely the air and light, and in other respects it may be beneficial to the tubers. These stems make good fodder. They may be dug early in the Fall, as wanted; but for Winter's use, not until the stems are withered, and preserved in sand in the cellar, or buried in a dry spot. It is frequently left in the ground undug till Spring. Pains should be taken, in digging, to cut or break the tubers as little as possible; for the smallest piece will vegetate, and appear in the next season.

The roots or tubers are the parts used for food—as pickles, and also cooked, mashed, and dressed as turnips, and after a little use they are generally well relished. They make good food for cattle, sheep, and hogs; the latter being often permitted to dig for themselves, and they thus pulverize the soil, which destroys grubs, and fits it for the ensuing crop, as enough seed is always left in the ground for the next crop; and thus a succession of artichoke crops on the same land is produced without further seeding. There are four varieties of the Jerusalem artichoke—the common white, not fit for cooking, except for baking or roasting, but making a very crisp, well-flavored pickle; the yellow skinned, the purple skinned, and the red-skinned varieties—which are finer flavored and more agreeable for cooking purposes. They are suited to persons in delicate health, when debarred from the use of most other vegetables. This vegetable has about the same amount of water in its organic composition as the potato; but instead of the large amount of starch, there is nearly the same quantity of sugar and nitrogen. As a field crop, for stock food, its yield is very large, and very profitable—an Ohio farmer has placed its production as high as seventeen hundred bushels per acre, which is perhaps overestimated.

The head-producing artichoke requires a light, rich, and rather moist soil, well trenched and well composted. It is propagated either by seed, or slips, or suckers: If by slips or suckers, they should be taken from well-established plants, in May, when they have grown five or six inches in height, and transplanted four or five inches deep, in rows four feet apart, separated two feet in the rows. If the weather is dry, water freely until the young plants are

well established; hoe frequently; in August or September the heads will be fit for use. The plants need a Winter protection of straw, or stable-litter. The first year's growth produces but few heads. If raised from seed, of which there are eight hundred and fifty in an ounce, they should be sown an inch deep, in drills a foot apart, in April, and transplanted when the plants are three inches high, in rows as above directed. By great care, they may be made to bear for three or four years. The heads should be cut as fast as they are fit for use, whether wanted or not, as permitting them to flower greatly weakens the plants, and the stems on which they grow should also be removed. For pickling purposes, the heads should be cut when about two inches in diameter; for other uses, when they have nearly attained their full size, but before the scales of the calyx begin to open. For what is called "bottoms," they should be cut at the largest size, and just as the scales begin to show signs of opening—an indication that the flower is about forming—for after blossoming, the head is comparatively useless.

For cooking and table uses, the lowest parts of the leaves, or scales of the calyx, are used; and also the fleshy receptacles of the flower, freed from the bristles and seed-down, which are unfit for use. The French blanch the central leaf-stock, and eat it like cardoons. The flower-head is boiled, and served with butter. The bottoms, which are the top of the receptacles, are fried in paste, and enter largely into fricassees and ragouts. They are sometimes pickled, and often used as a salad, dipped in oil, vinegar, salt, and pepper. What is called artichoke chard, is the tender leaf-stalks blanched, and cooked like cardoons.

There are several varieties of the head-producing artichoke—dark-red spined, early purple, green globe, green provence, laon, large flat Brittany, purplish red, and green or common; the latter being both hardy and prolific, is esteemed one of the best sorts for cultivation.

Asparagus.—This delicious vegetable is one of the earliest products of the garden, and every family should have a bed, which should be made as soon as the soil and season are favorable. The giant asparagus is an excellent variety; but CONOVER's colossal asparagus is represented as a great improvement, both in size and quality, upon any variety known. It comes into bearing earlier, and its sprouts average from two to four inches in circumference.

To Raise Plants from the Seed.—Get your seed, the giant or colossal variety if you can; early in the Spring, soak it in quite warm water, for a few hours; then mixing a few radish seed, sow in a properly prepared bed, about as deep as you would onion-seed. As the asparagus-seed germinate slowly, and the radish quickly, you can tell by the latter where the rows are so as to keep the ground free from weeds. You need have no fears of pulling up the asparagus for grass or weeds, for when it sprouts it is easily detected, as it looks "*just like asparagus.*" The first season the roots will make a growth as large as a fair-sized strawberry plant.

The Asparagus Bed.—This can not be made too rich. The method usually pursued in making an asparagus bed has been to throw out the soil the size of the bed desired, to the depth of eighteen inches or two feet, and then fill up with all manner of composts and strong manures, with alternating layers of good natural soil; but unless the soil is sandy, there is danger of the bed holding water, and eventually drowning out the plants. To avoid this, have a tile or covered drain from the bottom of your bed to carry off the surplus water, with a good outfall—then the more manure and rich composts, the stronger the plants will grow.

Another mode of preparing the bed: Dig a trench fifteen inches deep on one side—a light, sandy soil is best—throwing the dirt all to the outside; place a liberal quantity of any kind of strong manure in the bottom. Commence another trench immediately along side; throw the top soil from this on the manure in the first, then the subsoil on that, and repeat until all is trenched. Fill up the last trench with the dirt from the first, and the whole is level.

Mark off the plat for rows two feet apart, and at each mark dig a trench one spade wide and six inches deep, and place the roots—those a year old are preferable—fifteen inches apart in the bottom, and cover with two inches of dirt. This will leave a ridge between the rows which is to be leveled down around the plants as they grow up, and as often as weeds begin to show. This may be done with a hoe, a little at a time, or all leveled at one or two operations—when the whole is done and the ground well settled, the plants will be but little more than four inches below the surface; they should never be less than that.

After the tops are killed by frost—never before—cut them off, and cover the bed with ma-

nure, eight to twelve inches deep. Put on in the Fall quite a heavy sowing of salt, and fork it in; and in the Spring scatter brine between the rows. In the Spring fork it over, using care not to hit the crowns, and rake smooth. Cut for three weeks the next year after planting, and each succeeding year cut six weeks. A mistake is often made by leaving it without cutting for a year or two for fear of exhausting the young roots; the heavy seeding which is the consequence, injures them much more.

Another experienced cultivator recommends the choice of a dry, well-drained spot for the permanent bed, opened to the sun, and if sheltered on the north side, all the better. Suppose the plat is to be four feet wide and sixteen long—a good size for a small family—mark it off with stakes at the corners. Remove the top earth to the depth of a spade, and lay it at one side of the bed. Wheel in coarse manure, to cover the bottom, and spade it in. Having trodden this down moderately, to prevent much settling afterward, throw back the top soil, and spade three inches more of fine old manure into this. Work the whole intimately together. If convenient, two or three inches more of rich, sandy loam may be spread over the plat, to receive the roots, though this is not essential. The bed, when finished, should be several inches higher than the walk. Three rows of plants, lengthwise of the bed, and eighteen inches asunder, each way, is a suitable distance. The common mistake is to set the roots too near together, making them crowd one another, and speedily exhausting the soil. Cover the crowns about four inches deep with good soil. No cuttings should be taken the first year, and never until the plants are three years old from the seed. Keep the beds clear of weeds throughout the Summer, and in the Fall remove the tops, spreading over the crowns about from three to six inches of manure. The coarse parts are to be raked off in the Spring, and the finer carefully forked in. Many deem asparagus beds benefited by annual coats of salt, just enough to cover the ground like white frost; while others stoutly contend that salt toughens the asparagus. Soap-suds, and other kitchen slops, may be applied occasionally with profit. A bed properly made and cared for, will produce well for many years—some say thirty; and if four feet wide by twenty-five feet long, should furnish three or four good dishes per week for an ordinary family during its season. Before

Winter sets in, cover the bed with about five or six inches of manure.

The *Gardener's Monthly* strongly recommends the planting of asparagus beds in August. The bed is prepared the same as for any other season, and, after cutting off the green tops of the young seedlings, the roots are set precisely as in Spring planting. They push new roots at once, and make eyes so strong, that even from one year old seedlings, some asparagus—but not, of course, very strong—has been cut the following Spring; and where two year old roots have been used, a full crop has been cut in the same time—a result no one expects from Spring planting. It will be best, in such cases, to cover the beds, after they have once become frozen, with some kind of litter, not to keep out frost, but to prevent thawing and freezing until the natural Spring season comes—otherwise the plants may be thrown out by the frost, and killed. After the tops are dead in the Fall, it is advisable to burn a quantity of straw over the bed, to destroy the seeds of the asparagus and foul weeds.

How to Cut it.—Some people very much injure their plants by the manner of cutting. The proper method of cutting is to scrape a little of the earth away from each shoot, and then run a sharp-pointed, long-bladed knife so as to cut off slantingly below the surface of the ground, taking care not to wound the younger buds, in the different stages of their growth. The cutting should never extend beyond the middle of June, or first of July.

How to Grow it Tender.—A French gardener cuts off the bottom of a wine bottle and places the bottle over a shoot of asparagus, which grows quite up to the cork, and though blanched, it is as tender as the short, green ends we find upon the white, uneatable stalks in common use. The bottles are given a strong coating of whitewash, which excludes most of the light. It would also keep off the asparagus beetles. Asparagus plants of enormous size, exhibited in the windows of eating houses in Paris, are produced by placing an inverted bottle over the plant as soon as it rises a short height from the ground, under which it speedily attains its gigantic proportions.

Beans.—Of the many kinds of beans enumerated for garden culture, a very few are all that are really needed. All kinds do best on rather a light, warm, dry soil, and should not be planted till the ground is well-warmed in the

Spring—the last of April to the middle of May, in northern latitudes, and earlier in the south—the slightest frost after they are up is pretty sure death to them.

Of the dwarf or bush beans, the Early Rachel, the Early Mohawk, Dwarf Wax or Butter Bean, Early Six Weeks, Early Valentine, Early China, Yellow Six Weeks, Union, Rob Roy, Late Valentine or Refugee, Royal White Kidney, Black Valentine, and a Thousand to One, are all excellent varieties, and worthy of cultivation. The Mohawk and Early China are probably the hardiest—the Valentine sorts the tenderest. Plant in rows two feet apart, in hills fifteen inches apart—or in drills, dropping the beans three or four inches apart, and covering them with an inch of fine soil. When planted in hills, they should be thinned to four stalks in a hill; the dirt frequently stirred, and the weeds kept down. A few rows of each sort planted every two weeks into July, will furnish a succession for the table from June till the middle of October. As beans do not occupy much ground, they can frequently be planted between rows of corn.

The best pole or running beans are the Large White Lima, the Large Green Lima, the Small Lima of Carolina, the London Horticultural, the Mottled Cranberry, and the Dutch Case Knife. Running beans are generally less hardy than the dwarf varieties. Plant in rich soil, in hills three and a half or four feet apart each way, and a little later than the bush bean, to avoid the danger of the seed rotting, covering from one to two inches deep. The Limas and Case Knife especially should be stuck in the ground, eyes down, as the broad lobes can not well turn in the soil to reach the surface. The common method is to train them on poles rising eight or nine feet above the surface. But training them upon strings or a trellis has been very successfully adopted, as represented in the cut:



The wire is stretched from post to post, two cords extending from each hill up to the wire. This gives more exposure, and adds to the attractiveness of the garden. When the plants reach the top of the brush, poles, or trellis, pinch off the ends, which will cause greater fruitfulness below.

Another mode of avoiding the use of poles, suggested by the *Horticulturist*, is, to place apple tree or other brush along the ground, where the beans are planted, for the vines to run upon—producing as large a yield as if poled, with less inconvenience, and with these advantages; shading the ground, thus keeping the earth moist, and at an even temperature, and avoiding the injurious effects of strong winds.

Selecting Seed Beans.—One thing in preserving seed beans should be more generally attended to than it is—saving the earliest. Among those beans which run or climb, there are many found at the bottom of the stalk which ripen long before those at the top. These should be selected and saved for seed. It is astonishing what a difference a little care in this respect will make in the course of a few years in the ripening of the crop.

To Increase their Size.—A solution of the sulphate of iron—copperas water—applied to the young plants, will cause them to grow nearly double their size, and impart to them a much more savory taste. A similar result may be produced by using water in which old nails have been permitted to rust.

Beets.—The proper soil for the beet is a deeply cultivated, light, well-enriched, sandy loam. Where such a soil is wanting, more pains must be taken to trench thoroughly, and compost and manure liberally. For early use the seed should be sown as early as the frost is out of the ground, and the soil can be worked; for Autumn use, about the middle or 20th of May; and for the Winter supply, from the 1st to the middle of June. For the early supply, it is best to soak the seed in warm water, or in rich decayed vegetable matter, well dampened, and kept near the fire for a day or two before sowing; when two inches in height they should be thinned to five or six inches apart, extracting the weaker, and transplanting to supply vacant places. The drills should be fourteen inches apart across the bed. The Early Flat Bassano is generally considered the earliest variety, being from seven to ten days ahead of the Early Blood Turnip-rooted Beet. The Early Blood or Turnip-rooted is a good variety of excellent quality. The London Blood is a new kind, highly commended for delicate flavor and brilliant color. The White Beet is esteemed mainly for its stalks, or the midrib of its leaves, which being divested of the leafy part improves the flavor of soups; or if peeled and stewed, it can be served like

asparagus. The Long Blood is the best for general Winter and Spring use, often growing, under favorable conditions, four or five inches thick, and twelve or fourteen long. These require more space—drills eighteen inches apart; and the plants should be thinned to eight or nine inches. To preserve the roots in fine condition for Winter, take them up carefully before hard frosts, and cover them with earth in a cool cellar.

Broccoli.—This is of the cabbage tribe, and over eighty varieties of it are enumerated. The Purple Cape being the best adapted to our climate, is the variety generally cultivated. The Walcheren variety, comparatively new and much resembling the cauliflower, is creamy-white and delicious. The seed should be sown about the middle of May, and the plants put out the latter part of July, to flower in October. If put out earlier, and the heads form during hot weather, they soon shoot up and blossom, thus rendering them unfit for the table. When a small quantity only is required for private use, it is best to raise the plants in pots. They can then be put out without retarding their growth, and the gardener is not subjected to the inconvenience of covering to protect them from the sun while taking root, or delay while waiting for cloudy weather; and by putting them out at proper intervals, a supply in an ordinary season, can be obtained during October and November. Being an excellent substitute for cauliflower, and more likely to succeed, it can be grown more freely, and rarely fails of producing an abundant supply. In this climate, the Flowering Broccoli is more uncertain; and though it may be well to attempt a few for variety, it is not safe to depend upon it for the main supply. Like cauliflowers, the varieties of this species of brassica require rich soil, and in other respects, similar treatment. Broccoli and onions can be raised on the same ground, by putting out the plants as if the ground was unoccupied, and before they spread to any great extent, the onions are ready to be taken off.

Brussels Sprouts, or Thousand Headed Cabbage.—There are but two varieties of this vegetable, which much resembles the Kale. They are the Dwarf, and the Tall or Giant Brussels sprouts—the former, which is somewhat earlier, and more tender and succulent, attains a height of eighteen inches or two feet; and the latter which is more hardy, and on account of its greater

length of stalk, producing many more heads, reaches nearly four feet in height. The stem is clustered around with miniature heads of cabbage, very tender and delicate, which are boiled and served like cabbages or cauliflowers. It is raised from seed, in hot-beds, and transplanted or sown in open ground-beds in April or May, and cultivated the same as the cabbage tribe—though it should not be grown near any other sort of cabbage. In September the early plantings will be fit for use; while the later ones will afford a succession for Autumn, or to be kept in the cellar for Winter use. This vegetable is quite hardy, and deserves more general cultivation.

Cabbage.—As the culture of this plant has been fully described as a field product, little need be added in relation to its garden cultivation. The Early Sugar Loaf, the Early Dwarf York, Little Pixie, and Winningstadt, are recommended for early use; the Large Bergen, Green Globe Savoy, Drumhead, and Marblehead varieties, for the Winter supply. The early kinds should be sown in a hot-bed in March or the first part of April, in the Northern States; though some sow in September, and transplant to a cold frame the last of October, covering with boards during severe weather. Some varieties, like those of Marblehead, do best when sown in hills where they are to remain. As cabbages do not head as well during the heat of Summer, the first crop is got in early, while the main or later crop is not sown until the middle of June. The late, large growing sorts should be two by two and a half feet apart. The Red cabbage is desirable for pickling.

Carrots—like cabbages—have been treated as a field crop. “The carrot,” says an eminent physician, “is a most wholesome culinary root; it strengthens and nourishes the body, and is very beneficial for consumptive persons.” Two kinds are enough for family use; the Early French Short Horn, a sweet, tender, early sort, of small size, and the Long Orange for the main Winter crop. The Early Horn will frequently give a good yield sown in July, after early peas or onions; but for early use, should be sown in a warm, rich, deeply-worked fine loamy soil, the first to the middle of April. Let the rows be one foot apart, scatter plenty of seed, cover one-half inch deep with fine soil, and thin to four inches at the second hoeing. The Long Orange grows largest and does best in rows fit-

teen inches apart, thinned to five inches. There is little danger of making the soil too rich, or working it too deep for this tap-rooted crop. Keep well hoed, especially while small. The main crop may be sown from the middle of April to the first of June—better early in May.

Cardoon.—This vegetable in general appearance and character, resembles the head-producing artichoke, attaining its full size the second year in a height of five or six feet. It is raised from seed; and as the plant is used the first year of its growth, and is liable to Winter injury, it should be sown annually, although really a perennial. It should be sown as early in the Spring as the weather becomes warm and settled, in drills three feet apart, an inch and a half in depth, and afterward thinned to twelve inches apart in the drills. It does not bear transplanting. Keep it free from weeds; and as it requires much moisture, it should be frequently watered, if the weather is very dry.

In September, the plants having attained their growth, are ready for use. The stems and midribs are thoroughly blanched, which is done in a dry day, when the plants are free from dampness. The leaves of each plant, says BURR, are carefully and lightly tied together with strong matting; keeping the whole upright and the ribs of the leaves closely together. The plant is then bound with twisted hay-bands, or bands of straw, about an inch and a half in diameter, beginning at the root and continuing the winding until two-thirds or three-fourths of the height is covered. If there is no heavy frost, the leaves will blanch quickly and finely without further pains; but, if frosty weather occurs, it will be necessary to earth up about the plants, as is practiced with celery, but care should be taken not to raise the earth higher than the hay-bands. Another method of blanching is simply to tie the leaves together with matting, and then to earth up the plants like celery, beginning early in September, and adding gradually from week to week till sufficiently covered. The banding process, however, is the superior one. Still another mode, convenient and economical, is to earth up a little about the base of the plant, tie the leaves together with thread or matting, and then envelop the whole quite to the top with a quantity of long, clean wheat or rye straw, placed up and down the plant, and tied together with strong cord or strong matting. The leaves will

thus blanch without being earthed up, and speedily become white.

Until the occurrence of severe weather, the table may be supplied directly from the garden; but, before the approach of Winter, the plants should be transferred, roots and leaves, to the cellar, where laying them down in rows, they should be packed in sand, in layers. They thus keep well, and become more perfectly blanched.

In France, the flowers are gathered, and dried in the shade; and, when so preserved, are used as a substitute for rennet, to coagulate milk.

Cauliflower.—There are several varieties of this delicious vegetable generally cultivated in this country—the Erfurt Dwarf, the earliest variety grown, Early Paris, Large Early White, the late White, Large Asiatic, and the Purple. BURR enumerates fifteen different kinds. The cauliflower is somewhat difficult to grow; and the chief impediment in producing early heads is, that the plants are not sufficiently forward before the approach of hot weather, which stints their growth, and prevents their flowering or heading. In order to avoid failure, they should be sown in September, in a rich bed; pot and protect the plants carefully through the Winter, and set them out in May. Or, sow the seed in a hot-bed in March, the same as early cabbages, and transplant them at the proper season. Some sow early beds in the open ground, and have very fair success. For the late crop, sow the seed in a cool, moist place, on the north side of a building or tight fence, and the plants will not be troubled with the little black beetle, so destructive to every variety of the cabbage tribe when young. Seed may be sown as late as the first to the tenth of May, for the Fall crop, setting out the plants the last of June. They need the same culture as the cabbage; frequent waterings will facilitate the heading.

Cauliflowers raised by open culture are generally fit for use in October. Such as have not fully perfected their heads, may, just as the ground is closing, be transplanted closely together in a box of earth, and put into a light cellar, where they will usually form good heads before Spring; or they may be taken up by the roots, and suspended, with their heads downward, in a light cellar, or other place secure from frost, where the heads will increase in size, and in a few weeks become suitable for use.

The Dutch are famous for the size and delicacy of their cauliflowers. Their mode of cul-

ture is as follows: In the Autumn they dig deep some ground that has not been manured; at the beginning of May they sow the large English cauliflower upon a bed of manure, and cover it with straw mats at night. When the young plants are three or four inches high, they harrow the ground that had been prepared the Autumn before, and with a wooden dibble eighteen inches long, they make holes about ten inches deep, at proper distance apart, and enlarge them by working the dibble round until the hole at the top is about three inches in diameter. They immediately fill these holes with water, and repeat this three times the same day. In the evening they fill them with sheep's dung, leaving only room enough for the young plant, which they carefully remove from the bed of manure and place in the hole with a little earth. Directly afterward they give them a good watering, and as soon as the sun begins to dry them, they water them again. When the head is forming, they pluck off some of the lower leaves of the plant, and use them to cover the head.

Celery.—This very agreeable esculent is yearly growing more and more in favor. BURR enumerates thirty-seven varieties—the White Solid, and the Red Solid, or Manchester Red, as it is sometimes called, are those more generally cultivated. TURNER'S Incomparable Dwarf White, is commended as one of the very best varieties, growing stout, crisp, and of exceedingly fine nutty flavor; and SEALEY'S Leviathan, white, very large and solid, is unsurpassed in flavor; while LAING'S Mammoth Red is also large, possesses a fine flavor, and an excellent keeper. Seed should be sown for an early crop as early as may be in March in a gentle hot-bed, and the plants transplanted, during a wet day if possible, in rich, light soil, four inches apart, in the latter part of April or early in May. This is simply for temporary growth, and they will need care and watering. For the later supply, seed sown in the last half of June will furnish plants for setting out the last of July.

These earlier plants will require transferring to the trenches about the first or the middle of July. The trenches, or rows, should be from three to five feet apart, to afford earth to bank up with. Fifteen to twenty inches in depth and one foot wide, forms a good trench, throwing the earth out between the rows. Fill in eight or ten inches of well-rotted manure—hog manure is highly commended—and the thrown out earth, equal portions, and in this set the

plants, six or eight inches apart, watering and shading if in hot, dry weather. Keep well hoed, and work in a little of the surface soil occasionally, leaving most of it to be returned early in October, when the stalks are carefully gathered up in the hand and tied with soft strings, or straw, and the finely-pulverized soil returned carefully about them, avoiding bruises, and not allowing the earth to get in the center of the plants, or be washed into them by rains. Some persons wrap each plant with a newspaper to prevent the earth from getting into the center. Leave banked earth in a cone form to turn water. A second earthing may be given late in October, and they will be finely blanched in a few weeks. Earthing up is sometimes, but improperly, done each fortnight during the growing season. Stalks should be grown in the air, and then blanched.

To keep celery good all Winter, select a dry piece of ground, and open a trench a foot wide, and deep enough to take the celery standing upright, leaving the tops standing a foot below the surface. Shovel out clean, and put in the celery, roots and all, as thick as it will conveniently stand together without crowding, pressing the soil close up to the heads at the side. Get some short pieces of board to lay across the trench to rest other boards on lengthwise, which will entirely close them in. Then cover with plenty of leaves and straw; or soil alone may answer, and without any other covering it will keep perfectly fresh till Spring. In getting out a portion at any time, cover the dirt when replaced with long manure. Enough should be taken out each time to last a month, and it may be kept in sand, in boxes, standing upright, in the cellar.

The new plan of sowing celery by JOHN ROBERTS, of London, with socket tiles—half cylinders joined—is attracting much attention, and is represented by the following cut:



A, represents two rows of celery in the trench before the sockets are used, with the horizontal tube placed between them for the purpose of watering.

B, shows two similar rows with the sockets placed round each head of celery prior to earthing against them.

C, shows the celery earthed up, as it appears in Autumn, previous to harvesting, or covering up for Winter use.

Corn.—There are several varieties of garden corn, and at least one good kind of sweet corn should find a place in every vegetable garden. Among the desirable varieties of garden corn, we may mention the Early Minnesota, 'Adams' Early White, Black Sweet, Burr's Improved Sweet, Darling's Early, Early Jefferson, Golden Sweet, Old Colony, and Stowell's Evergreen Sweet, together with some of the good pop-corn varieties. In northern latitudes, plant early sorts the last of April, or very near the first of May, and later sorts the middle of May, first and middle of June, to keep up a succession, covering one inch in rows three feet apart. It will come to maturity planted up to the tenth of July. In its season, the kitchen may properly make large and frequent drafts upon the green corn, boiling the ears, making puddings and succotash, and drying a goodly quantity for Winter.

Cive, or Chive.—This variety of the onion family is a hardy perennial bulb, which once planted, grows in any soil, and for a number of years, being quite frost proof. Plant a few inches apart and two inches deep. The fine young leaves come out very early and constitute one of the best of salads.

Chufa, or Earth Almond.—This perennial plant is sometimes called the Edible Cypress, or Nut Rush. It is propagated by planting tubers in April or May, two inches deep, in drills two feet asunder, and six inches apart in the drills. At the extremities of the long and fibrous roots are numerous oblong, jointed, pale-brown tubers, of the size of a filbert; the flesh of which is of a yellowish color, tender, of a pleasant sweet flavor, somewhat similar to that of the almond. They keep a long period, and are eaten either raw or roasted. In Spain, Cuba, and other hot countries, they are employed in preparing orgeat, a species of drink, made by mashing the chufa to a flour, and mixing it with water, imparting to it the color and richness of milk.

Citron.—The citron-melon is almost solid and tasteless, and is much used for preserves.

It is little more than a vehicle for the exhibition of sugar and various flavorings, but the result is a favorite confection for the table. Its culture is the same as that of the water-melon and cucumber.

Cress and Water-Cress.—Cress, or pepper-grass, is a very early, delicate, and pungent salad. It may be grown fit for use in a hot-bed in forty-eight hours. Sow thickly and broadcast on rich, light ground, covering very lightly, and press in smooth with a spade. If very dry, give occasional but light watering. Ready for use when one inch high, and best when once cut, but may be grown to several inches, and cut repeatedly. Water-cress is also a very early and healthful salad, found growing in springs or streams of pure water. It may be propagated by throwing a few plants upon any such stream or spring. It may also be cultivated in low, wet soils, where it will be sure of plenty of water. Dig deep, set the plants six inches apart, and water them well.

Cucumbers.—There are many varieties of this running plant, but the Early Russian, Early Cluster, Early Frame, Early Short White Prickly, Long English Frame, Long Prickly Green, and the Manchester Prize, are all good and sufficient for ordinary gardens. They do best on a rich soil. A few early plants raised in the hot-bed, and transplanted, would be desirable. Dig large, broad holes, and fill them with hog manure, stamping it down closely, and making it as compact as possible. Draw on one inch of soil, drop your seeds early in May, or even later, and cover one-half of an inch deep. Over this covering spread half an inch of the finest old black manure, mixed with a liberal quantity of charcoal and house ashes. For later uses, and for pickles, plant as may be desirable, not later than the middle of July. The hills should be about six feet apart. After going through with the attacks of bugs, and sometimes the cut-worm, thin to two or three strong plants a hill; and it is advisable to clip from the vines, with the shears, many of the surplus leaves, which interfere with each other. No cucumbers should be permitted to ripen so long as a fresh supply for the table is desirable.

While the ordinary mode is to plant in hills, the same ground will yield much better, by having the vines at equal distances from each other, than if two or three are left together in the same hill, since the roots have more room

to grow, and they find a greater amount of nourishment when thus isolated. The fruit will also be more solid and of better quality. It should be remembered that air and light are essential to the growth and maturity of the fruit; and it is better to occasionally cut out a thrifty plant, than that the ground be too densely covered. Just vines enough to thinly cover the ground will produce better than double this number.

Cucumbers are often finely grown by planting in a tub or half barrel, partly filled with manure, putting six inches of dirt on top, in which to plant the seed, and setting it near the kitchen to receive the slops thrown out. The barrel should have several augur holes in the bottom, to allow the water to pass out.

For Pickle Culture.—Plow and prepare the ground with as much care as for a premium crop of corn, the latter part of June—enriching each hill with a shovelful of well-decomposed manure. In about six weeks from planting, provided the vines do middling well, you may begin to pick your pickles; they will require picking every other day during the season, which often lasts till frost. None but careful persons should be employed in picking, for treading on and tearing the vines is very destructive; use a sharp knife or scissors to sever the pickle from the vines; leave the stems one-fourth to one-half an inch in length. From two to four persons will be required for each acre, as the picking is slow, back-aching work, and requires care. All sizes are picked clean together, and afterward assorted into two or three sorts or sizes, rejecting as worthless all nubbins, yellow bellies, etc. The smaller ones are suitable for bottling, the larger for putting down in tubs or barrels, and the largest as cucumbers for market, etc. The produce of an acre to pickles varies, like all other crops, reaching sometimes as high as twenty-five thousand dozen.

Egg-Plant.—This plant, quite generally cultivated, is allied to the tomato, and is similarly used. It possesses less flavor, but the fruit grows to a much larger size. For early use, plants should be raised in the hot-house, or in pots in the kitchen, and not transplanted to the garden till the weather is sufficiently warm, as the young plants are tender and liable to get chilled, from which they recover but slowly. In favorable seasons the egg-plant may be raised from seed sown in the open ground in May, and transplanted into good soil in a warm

and sheltered situation, in rows, two feet apart either way. There are several varieties cultivated, the principal of which are—the American Large Purple, producing fruit often measuring seven inches in diameter, and weighing four or five pounds, Long Purple, Large Round Purple, New York Improved Purple, by many esteemed the best, White egg-plant, Chinese Long White, Gaudaloupe Striped, and Scarlet-fruited egg plant.

Endive.—This is a hardy annual, attaining a height of from four to six feet, the leaves only used, when blanched to diminish their natural bitterness, for Autumn, Winter, and Spring salads. It is raised from the seed, in any good, mellow-garden soil, and may be sown where the plants are to remain, or in drills for transplanting. There are several sorts of two general varieties—one the Batavian variety with broad leaves, the other the curled-leaf variety. The curled-leaf kinds should be in drills, twelve or fifteen inches apart; and the others require three or four inches more space.

There are several modes of blanching the endive. It is sometimes done by earthing, as practiced with celery, or cardoons; and sometimes common flower-pots are inverted over the plants, rendering them white, crisp, and mild-flavored. But the more common method is, when the roots have nearly attained their full size, they are taken when entirely dry, gathered together into a conical form or point at the top, and tied together with matting, or any other soft, fibrous material; by which means the large outer leaves are made to blanch the more tender ones toward the heart of the plant.

For Winter use, after having been tied up in the conical form as directed, and stripped of all their dead or yellow leaves, take them up with the soil adhering to each, and put only their roots into light earth in a cellar, not suffering them to touch each other, but pouring a little water around the roots after they are placed in the earth.

Flavoring and Medicinal Herbs.

The following embrace the more common and important of the flavoring and medicinal herbs, which are found to be more or less needed in all families. A light, dry soil is the most appropriate for growing the greater part of them, but if such as lavender, rosemary, rue, sage, wormwood, and a few others, are planted in a rich, moist soil, much of their aromatic

qualities evaporates, and they are rendered less fitted for withstanding the severities of Winter.

Angelica.—A biennial, propagated from the seed, sown in a moist soil, and when transplanted to a similar situation, the plants should be about three feet apart. If not allowed to run to seed, they will thrive many years. The stalks are used as a sweetmeat, when candied by confectioners, and the seeds and roots are greatly extolled by the Laplanders for coughs and chest disorders.

Anise-Seed.—An annual, propagated by sowing the seed in light, dry soil, thinning the plants to six inches apart. The seeds, which ripen in August or September, have a warm, aromatic flavor, and are especially useful in flatulent colics, and obstructions of the breast, increasing the secretion of milk, and for strengthening the tone of the stomach.

Asparagus.—The green root excites the secretion and discharge of urine, in a decoction of one or two ounces of root to a quart of water; and the unripe berries, made into a syrup, have been used advantageously for heart disease. The seeds have been found a very good substitute for coffee.

Balm.—A perennial, propagated by separating the roots in Spring or Autumn, and planting in beds eight or ten inches apart. Balm was formerly much used for nervous diseases; and an infusion of the herb, or "balm tea," is still a popular domestic medicine, forming a harmless and efficacious warm drink in producing perspiration, and a grateful drink in fevers, either by itself or acidulated with lemons.

Benne Plant.—An annual, cultivated in the Southern States, and raised in gardens as far north as Philadelphia, though it does not usually ripen its seeds there. The leaves abound in mucilage, which they readily impart to water. Given as a drink, it is considered very serviceable in bowel complaints of children, also for catarrh and urinary diseases.

Caraway.—This biennial aromatic plant is cultivated chiefly for its seed. Sow in Spring or in Autumn, soon after the seed is ripe, and thin to the distance of a foot apart each way; in July it is fit for cutting; thrash it upon a cloth. The seed is used in cakes, confectionery, and medicine; the tender leaves in Spring are sometimes boiled in soups. Caraway is a pleasant stomachic and carminative, and is occasionally used in flatulent colic. An infu-

sion may be formed by adding two drachms of the seeds to a pint of boiling water.

Camomile.—A hardy perennial plant, and easily propagated by parting the roots, and setting them, early in the Spring, in rows a foot apart. It produces an abundance of flowers from June to September, which are gathered and dried. The flowers possess tonic properties—used in powders of half a drachm to a drachm a dose, three or four times a day, and a watery infusion of them is frequently used for the purpose of exciting vomiting, or aiding the operation of emetics. A decoction is often used to assuage pain, and the flowers are applied externally as a fomentation in cases of inflammation or irritation.

Chervil.—An annual plant, with leaves resembling those of the double parsley; and sown in rows, like parsley from April to September. It is used for salads and in soups.

Comfrey.—A useful perennial plant, the root only of which is used, possessing mucilage in great abundance. It was formerly much used for internal wounds, and is still employed for throat, lung, catarrh, and intestinal diseases, and for emollient poultices and salves. As an inward medicine, it is best taken in a decoction or syrup.

Coriander.—This hardy annual is usually sown in the Spring, thinning the plants to six or eight inches, and maturing in August, when the seed is gathered. The seed is much used in cakes and confectioneries, as well as in combination with other medicines to disguise their taste, or to correct their griping qualities.

Dill.—The seed of this hardy perennial should be sown in beds, or drills, or broadcast, thinning the plants to six inches apart. The seeds have a moderately warm, pungent taste, and aromatic but not very pleasant smell. The seeds and leaves are used for imparting a flavor to pickles, and occasionally in soups and sauces.

Elecampane.—This very useful perennial delights in a moist, shady situation. It can be propagated by dividing the root in the Autumn. The roots are thick, carrot-shaped, and aromatic; and when dried, ground, and made into a tea, it is considered excellent for a cold; and sweetened with honey, is a whooping-cough remedy; it is both a tonic and an expectorant, and is externally applied for disorders of the skin.

Fennel.—This perennial plant is generally propagated from the seed, sometimes from offsets. They should be thinned, or transplanted to fifteen inches asunder. The tender stalks

are used in salads; the seeds have a pleasant anise-like taste and odor, and are used as an aromatic; the leaves, boiled, enter into many fish sauces; and, raw, are garnishers for several dishes. The finocchio variety, grown in rows, may be earthed up to the height of five or six inches, which blanches the stalks in ten days to a fortnight, when they are eaten with oil, vinegar, and pepper, as a cold salad, and they are likewise sometimes put into soups. It is frequently employed in an infusion as an injection for the expulsion of wind from infants.

Garlic.—This bulbous plant of the onion tribe, is propagated by planting the cloves or bulbs in drills six or eight inches apart, and four inches from plant to plant. If put out in October or November, the roots will be much larger than if deferred till Spring. About the end of July the bulbs become full grown, and should be gathered, dried, and tied up in bundles, and hung up in a shed or room for future use. The French employ it in sauces and salads. Medicinally, it is a powerful stimulant, quickening the circulation, exciting the nervous system, promoting expectoration in debility of the lungs, causing perspiration and urine; bruised and applied to the feet, it acts very beneficially in disorders of the head; a clove of the garlic, or a few drops of the juice, introduced into the ear, often prove efficacious in atonic deafness. It is also used in cases of chronic catarrh; moderately employed, it is beneficial in enfeebled digestion and flatulence. It is frequently used, bruised and steeped in spirits, as a liniment in infantile convulsions, and other spasmodic or nervous affections in children, and in eruptions of the skin. It is among the most valuable medicinal productions of the garden. A dose is from half a drachm to a drachm, or even two drachms, of the fresh bulb; that of the juice is half a fluid drachm. It may be taken raw, cut up; or formed into a pill; or the juice may be administered mixed with sugar; or made into a syrup.

Hoarhound.—Is readily grown from seed, or by division of the roots; its roots being perennial, producing numerous annual stems. It is a valuable tonic, and in large doses, laxative, and may be so given as to increase the secretions of the skin, and occasionally those of the kidneys. It is employed chiefly in catarrh, and often chronic affections of the lungs, attended with cough and copious expectoration. It has been also employed in humoral asthma, consumption and liver affections. The juice of this herb, with sugar, is esteemed good for

colds. The strength of hoarhound is diminished by drying, and eventually lost by keeping. It may be given in an infusion of an ounce of the herb to a pint of boiling water, in wine-glassful doses; or in powdered doses of thirty grains to the drachm.

Hops.—As the hop as a field crop has already been fully treated, it only need be added, that a few roots of this hardy and valuable perennial should generally find a place in the garden, or over some trellis or arbor. They require to be gathered before the frost touches them. Besides their use in making yeast and beer, they are scalded and applied in flannel as a poultice or fomentation, constituting an excellent anodyne; and in the form of hop tea they are one of the best of tonics.

Horse-Radish.—This warm, pungent plant is easily grown from cuttings or roots, in any deep, rich soil. It is best after standing out all Winter. It is a very agreeable condiment with meats, and is regarded as a healthy excitant of appetite. Medicinally, it promotes the secretions, especially those of the urine, and invigorates the digestion; it is used in cases of the dropsy, attended with enfeebled digestion and general debility, and internally and externally in palsy and chronic rheumatism. It is much esteemed in cases of scurvy, and applied externally it produces an outward irritation. In cases of hoarseness, a syrup of horse-radish and sugar, slowly swallowed, one or two teaspoonfuls at a time, is very useful.

Hyssop.—This perennial plant is easily propagated by sowing the seeds in a light mold, or by slips and root-partings. Its use is recommended in asthmas, coughs, and lung disorders; and an infusion of it has long been a popular febrifuge.

Lavender.—This hardy perennial plant is raised from seed or cuttings—thinned in rows two feet apart. The flowers are a stimulant and tonic, often employed as a perfume, and some times used as a conserve.

Leek.—A hardy biennial bulbous plant, propagated from the seed, sown in drills sixteen inches apart. The whole plant is used in soups and stews, but the blanched stem is most esteemed. It is gently stimulant as a medicine, with a peculiar direction to the kidneys; the expressed juice, mixed with syrup, may be given in a fluid drachm to a dose.

Lemon Balm.—This plant is raised like summer savory, and is used for making tea for coughs and colds, as a sudorific.

Marigold.—The leaves of this well-known

garden plant, which is raised like sage or summer savory, are gathered and dried for use in soups; made into tea for measles, and an extract is sometimes used in cancerous and other ulcers.

Mustard.—The White or Yellow Mustard is raised, by frequent sowing, and is used as a small salad and for greens. It is, medicinally, a tonic and an aperient, cleansing the stomach and bowels, and bracing the system at the same time.

Nasturtium.—Sow in good soil in drills, an inch deep, and three feet apart, and brush them like peas; or raise them beside a fence or trellis upon which they may climb; or, they will do very well, if planted in hills four feet asunder each way, even without brushing. The plant is esteemed useful in scorbutic affections, and visceral obstructions—giving the expressed juice in doses of one or two ounces. But the herb is more frequently used in the form of a salad; while the flower-buds and the green seeds, with their tendril-like stem, make pickles which are often preferred to capers.

Okra.—This annual plant, abounding in a ropy mucus, is readily cultivated, and the pods give a delicious flavor to soup, and are good stewed as a vegetable, and served with butter. The green pods also make a good pickle. Plucked when perfectly tender, they can be dried for Winter use. It is said that the ripe seeds, which are as large as a small pea, when roasted and prepared like coffee, are a good substitute for it; though it is doubtful if they are as good for that purpose as the seeds of asparagus.

It is said on high authority, that there is no plant grown in the garden that affords cheaper food than okra. It should not be planted till the ground becomes warm in the Spring, and should be treated like Indian corn in all its cultivation, as it grows well in soil suitable for corn. It is sometimes sown in drills three feet apart, and improved by manure and tillage. The large kind grows five or six feet high; but the dwarf variety, which does not grow more than two or three feet high, is very prolific of branches and pods, and is, preferable to the larger kind. It is highly recommended for more extensive cultivation by those who know and appreciate its value.

Parsley.—Sow in drills twelve inches apart, in rich, light soil, thinning the plants to three inches. There are the curled and plain varieties—the former, the more beautiful, but less vigorous in its growth. The roots may be taken

up, and stored in the cellar for Winter; and sometimes it very well withstands the Winter if left where it grew, and covered with litter or evergreen brush. It is said to be aperient and diuretic, and is used, in connection with other medicines, in dropsy, and kidney affections; but it is chiefly grown for garnishing, and soups.

Pennyroyal.—Is grown by dividing the roots in the Spring, and planting in rows or drills in a strong, moist soil. It is a gently stimulant aromatic, and may be given in flatulent colic and sick stomach; when administered as a warm effusion, it promotes perspiration. It is much used in exciting the menstrual flux when the system is predisposed to the effort; a light draught of the tea is given at bed-time, in cases of recent suppression of the menses, the feet having been previously bathed in warm water.

Peppermint.—The cultivated variety, not the wild native plant, is propagated by dividing the roots in the Spring, preferring a soft, rich, moist soil. The stalks are gathered when in full flower; in some regions it is profitably cultivated for the manufacture of the oil of peppermint, so largely used by confectioners. It is also extensively used for medicinal purposes, in flatulent colics, hysteric affections, and retchings, in which it acts as a cordial. Another variety, usually denominated mint, is raised by dividing the roots and planting them in drills, the tender young stems and leaves being used in convivial drinks, of the julep family.

Peppers.—The seed should be sown first in a hot-bed, or in pots, and transplanted in May or June, in good soil, twelve inches apart, and eighteen inches from row to row. They should be grown plentifully, for seasoning all soups and stews, for pickles, and for medicinal purposes. They are far healthier than imported pepper. The Long Cayenne, and Cherry Pepper, are dwarf sorts—the former very pungent. The Squash Pepper is rather mild and very productive, and its tomato-shaped pods are nice to pickle green. The Sweet Mountain variety is much larger; and the Sweet Spanish is the mildest of all for eating green as a salad, and for pickling purposes. It is a powerful stimulant, used in cases of enfeeblement and languid stomach, sometimes in dyspepsia and gout, in palsy and lethargic affections; in malignant sore throat and scarlet fever, as a gargle; and, in a more diluted state, for milder cases of scarlatina, with inflamed or ulcerated throat. Cayenne pepper is also applied externally for

local rheumatism, and in other cases where a surface stimulant is necessary.

Rosemary.—Propagate by cuttings or rooted slips, in poor, light, limy soil, in rows eight or ten inches apart; or sow seed early in the Spring, in drills, an inch deep and six inches apart. This is a fragrant, woody plant, used as domestic perfume, and is reckoned one of the most powerful of those herbs which stimulate the nervous system, and for various affections proceeding from debility. It is generally given in the form of an infusion.

Rue.—This hardy shrub is grown in a manner similar to rosemary. Its properties are stimulant, astringent, and narcotic, and it is used in colic, hysterics, or weak constitutions suffering from retarded or obstructed secretions; but it is a plant that should never be used unadvisedly. An infusion of the tops, given in liquor, in the morning, after fasting, is a most effectual remedy in expelling worms.

Saffron.—Plant the bulbs in rows, six or eight inches apart, and three inches asunder in the rows. The flowers are gathered in September, and dried. In small doses, it mildly excites the different functions, and exhilarates; in large doses, it produces headache, delirium, and other alarming symptoms, and might prove fatal. In domestic practice, saffron tea is used in eruptive diseases, to promote the eruption.

Sage.—This useful perennial is propagated by seed, or slips, or cuttings; it is deemed best to sow seed every year, and not keep the roots over two years. As a tea it is used to produce perspiration; and is employed in cookery of various descriptions.

Scurvy Grass.—This hardy biennial plant is propagated from seed, or by parting the roots in a light, moist soil. It has been considered one of the most effectual of all scurvy remedies when eaten with water-cress or other salads.

Sorrel.—This plant indicates a poor, sour soil; but the plant itself is sometimes used in salads, occasionally boiled as a sauce, and it may be cooked similarly to spinach. It is also regarded as an effectual remedy against scurvy.

Summer Savory.—The Summer variety, an annual, is sown early in Spring, in drills a foot apart; the Winter variety, a perennial, is propagated by seed, cuttings, or divisions. Both are much used for culinary and medicinal purposes; to lessen viscid humors, dispel flatulency, and increase the appetite. It should be cut for drying soon after it begins to blossom. The dry leaves are said to be offensive to fleas.

Sweet Basil.—This fragrant little garden plant is cultivated for culinary purposes. The seeds are sometimes used in the form of an infusion, in kidney and urinal affections.

Sweet Marjoram.—This being a somewhat tender plant, should be started in the hot-bed, and transplanted; or sown somewhat late in the open garden. It is a tonic and gently excitant; but is used more as a condiment in cookery than as a medicine. In domestic practice, its infusion is often employed to hasten the tardy eruption in measles, and other eruptive diseases.

Tansy.—This perennial is easily propagated from the seed, or by parting the roots. It is tonic and stomachic, and its seeds are said to be most effectual as a vermifuge.

Thyme.—Propagated by seeds, cuttings, or divisions, and is more employed in cooking than in medicine. An oil is distilled from it, often used as a mild irritant in chronic rheumatism, sprains, etc. and is an ingredient under the name of oil of origanum, in opodeldosc.

Wormwood.—This is a hardy perennial, raised from seeds or slips. It is valuable as a tonic and as a vermifuge, and very powerfully resists putrefaction. Its leaves, bruised, and wet with vinegar, are esteemed a valuable application for sprains and bruises.

To Preserve Herbs.—All kinds of herbs should be gathered on a dry day, about the time of blossoming. Tie them in bundles and suspend them in a dry, airy place, with the blossoms downward. When perfectly dry, wrap the medicinal ones closely in strong paper and keep them from the air. Pick off the leaves of those which are to be used in cooking, pound and sift them fine, and keep the powder in labeled bottles, corked up tight.

Kohl Rabi, or Turnip Cabbage.

This is a garden vegetable, intermediate between the cabbage and the turnip, producing on the stalk a large turnip-shaped fleshy bulb. Like the cabbage and the turnip, it seeds the second year. The young plants are raised and transplantings are made very much as in the case of cabbages, only they will bear being nearer together; or for a general crop they may be sown in drills, in May or June. The bulbs are fit for use when they attain the size of an early Dutch turnip; and, when cooked, are eaten with sauce or with meat, as turnips usually are. They are, while young and tender, sweeter and more nutritious than the cabbage

or white turnip, and are thought to keep better than the turnip.

Lettuce.—This is one of the best of all the salad plants, and always raised from the seed. They are generally divided into two classes—the cabbage and Cos lettuces—the former of which are found to be much superiors to the latter in size, crispness, and flavor. The smaller variety may be earliest produced; and, by starting them in a hot-bed, it will be fit for the table two weeks earlier than if raised in the open garden. It may be sown in September, and covered during the Winter. Of the cabbage varieties, may be enumerated the Malta Drumhead or Ice cabbage, Brown Dutch, Brown Milesian or Marseilles cabbage, Brown Winter cabbage, Early or Summer Cape, Early Simpson, Early White Spring or Black-seeded Gotte, Green Curled, White Silesia, and Versailles. There are several of the Cos varieties, among which are CARTER'S Giant White Cos, the Paris Cos, the Green Paris Cos, Essex Champion, the Brown Cos, the Artichoke-leaved, and the Red Winter Cos. For Summer use sow the cabbage varieties in a cool, moist place, as the north side of a fence. The large kinds should be eight or ten inches apart. Lettuce in its raw state is emollient, soporific, cooling, and, to some extent, laxative and aperient.

Melons.—These require a rich soil and good culture, very similar to that of the cucumber, save that the water-melon, which runs a greater distance, should have the hills six or eight feet apart. Good manure—hog manure is excellent—worked deeply and thoroughly into the ground before planting, will greatly facilitate their growth. Take a barrel with both heads out, set on the surface of the ground, and fill in as much manure as you please—it will do no harm to fill it full, or nearly full; then raise a mound of earth around it, and plant the seeds on the side of the mound. If too much rain falls, cover the barrel, but in dry weather turn water upon the mound, and it will soak out among the roots without baking the surface. A little old hay or straw should be placed on the top of the barrel, to prevent the drying effects of the sun and air. These melon plants are liable to become hybridized by bees and insects, if grown together; hence it is best to plant each sort as much by itself as possible.

Among the water-melons, the Black Spanish, Mountain Sweet, Mountain Sprout, and Long

Green are desirable sorts. BAYARD TAYLOR says he has produced a hybrid melon by crossing the Persian with the Mountain Sweet. "The result," he says, "is a water-melon which, I think, can not be surpassed for size, delicious crispness of flesh, and sweetness of flavor. The largest three of these melons were in diameter 20 by 13, 17 by 14, and 18 by 14 inches; the heaviest weighed forty pounds. I found them invariably solid and sweet, with a mass of crimson flesh, four or five inches in diameter in the center, and the narrowest possible rind. As they ripen in September—a fortnight to three weeks later than our American varieties—I think, if care is taken to prevent further hybridizing, they will become a valuable acquisition. I have never, in any part of the world, found a water-melon equal to the specimens of this new variety which I have raised this Summer. I have named it the *Russian-American melon*."

The old yellow musk-melon has given place to the better green sorts, among which are the Early Christina, Netted Citron, Skillman's and Allen's Netted, Nutmeg, Prolific Nutmeg, Persian, Pine-apple, and Japanese—all good varieties. The White Japanese musk-melon has been pronounced the sweetest thin-skinned melon yet introduced into our country.

The method of raising musk-melons by JOHN DINGWALL, of Albany, strongly commends itself to the good sense of all: Manure is the first consideration. I use none but horse manure; having had it laid up to ferment, I turn it over several times until the strong heat has passed off. I then dig my holes twelve inches square, eight or ten inches deep. I then fill up with manure to the level of the surface of the ground. On this I put two inches of soil. I then take a four-inch flower-pot; set this in the center; then draw the remainder of the soil around the pot, pressing it rather firmly around it, until I have the soil about four inches deep; then, giving the pot a twist round, withdraw it. This leaves a hole four inches deep by four wide. In this I drop five or six seeds, and cover to the depth of three-quarters of an inch. Over this I place a light of six-by-eight glass, pressing it lightly to fit close. I then give no more attention till the plants are touching the glass. I then go through them, taking a small lump of earth or small stone, raise up one end of the glass and place this under it; this admits of a circulation of air over the plants and hardens them off. In about three days more I remove the glass en-

tirely. By this time they will be in the rough leaf. I thin out to three plants in a hill. I draw a little fine soil around them, up as high as the seed-leaf, and the work is done. The advantages of this system are, the protection of the young tender plants from cold winds and rains, and last, though not least, it is the only effectual way of protection that I have found for that arch enemy of all this class of plants, the striped-yellow bug. Cucumbers, water-melons, and squashes can be raised in the same way."

To increase the melon crop, pinch off the leader a few inches from the hill, leaving only the laterals to grow.

Onions.—Onions are raised from three kinds of seed or bulbs, viz.: the ordinary black seed, the top onion, where each small bulb grows to a large one, and the potato onion, where the bulb cracks or splits open as it grows and forms two to four bulbs in a cluster. The soil for onions should be made very fine and rich, worked deep, and if lime, ashes, or salt be freely incorporated with the soil, the maggots will be less troublesome. Rake the ground to remove stones, lumps of dirt, etc., and sow about the middle of April in drills one foot apart, covering one-half inch and thin to four inches. The Early Red and White Globe are among the best sorts; while the Danvers Yellow, Large Yellow, and Silver Skinned are excellent varieties. The potato and top onions may be set out at the same time in rows one foot apart and four inches distant, just covering the crown. They will be fit for pulling in July, and may be entirely removed in August for late turnips or cabbages. In common with other vegetables, they should be kept free from weeds. The top and potato sorts may be grown where the maggot destroys those raised from the seed. Hot water poured along the row from the spout of a tea-kettle is the best remedy for the worms when at work.

A gardener in central New York gives the following method of preparing onion-seeds for planting, to give them an early start: "About the first of April I put my seed into blood-warm water, set it where it will not freeze, and let it remain from twelve to fifteen days. I am careful to have the water always cover all the seed. In two or three days one can tell if the seed be good by the strong onion smell it will emit in case it is all right. I drain the water off from the seed, and stir among it some plaster, keeping it, however, a little moist and warm. At

the end of three days the seed will have thrown out sprouts half an inch long. I then plant it, covering about half an inch deep with earth, and in six days one can see the rows."

Oxalis, or Tuberous-Rooted Wood Sorrel.

—There are two varieties, one the White-rooted, the tubers of which should be started in a hot-bed, and transplanted to the open ground in May, in a dry, fertile soil, in a warm situation; in hills two and a half feet apart; or in drills two and a half feet apart, and the plants or tubers at a distance of fifteen inches. The oxalis is cultivated in all respects like potatoes, producing small tubers which form late in the season. The yield is comparatively light. They are used the same as potatoes, the flesh, yellow, dry, and mealy, having the potato flavor, with a very slight acidity. The tender, succulent stalks and leaves are used as a salad.

The other variety, Deppe's oxalis, is a perennial plant, propagated from the seed or bulbs, six inches apart, in rows one foot asunder. As the frost approaches, they should be taken up, the roots divested of their numerous bulbs, and stored away in a cool, dry place, secure from frost. The bulbs should be kept dry, or in sand, till wanted for planting. The young leaves of the oxalis are dressed like sorrel in soup, or as a vegetable; having a fresh, agreeable acid, especially in Spring. The flowers make an excellent salad; while the roots are gently boiled, in salt and water, after cleansing and partly peeling; and eaten like asparagus in the Flemish fashion, with melted butter and the yolk of eggs.

Pak Choi, or Chinese Cabbage.

—This annual plant of the cabbage family, and a similar one, Pe-tsai, are raised from the seed, sown in rows, the former thinned to twelve, the latter to eighteen inches apart. Used like cabbage; the leaves of the former, when boiled, are much more tender, and of a more agreeable flavor; the latter is sweet, mild-flavored, and easy of digestion.

Parsnips.—They require a deep, rich soil in which to perfect themselves. Grown in a muck swamp, they attain a length of two feet or more. Cover the seeds half an inch, sowing from the middle of April to the middle of May, in drills eighteen inches apart, and thin to six inches in the drill. They are improved by freezing in

the soil; hence after digging what are wanted for the Winter, leave the rest in the ground till Spring. They contain a considerable portion of sugar; and as food they possess more nourishment than either carrots or turnips. An excellent marmalade is made from them, and wine also, to some extent. The Sugar or Hol-low Crown is the best sort for cultivation.

Pea-Nut.—The African pea-nut, and the Wilmington, or Carolina pea-nut, are largely cultivated in the Carolinas, the Gulf States, and California, but do not succeed in the Northern States. They are sown in drills, in deeply-plowed well-cultivated ground; and earthed up from time to time until they blossom. The lower blossoms, which alone produce the nuts, after the decay of the petals, insinuate their ovaries, into the earth several inches, where the nuts are perfected.

Peas.—Peas are in such great variety, it is difficult to make a selection. Two, or at most, three sorts are sufficient for ordinary farmers. CARTER'S First Crop, the earliest and most productive, the DANIEL O'ROURKE, or Prince ALBERT, will answer a good purpose for the first early ones; after which we want nothing better, if indeed, better peas can be found, than the Champion of England and Tall Sugar. If not convenient to stake or bush, sow BISHOP'S Dwarf, Tom Thumb, Dwarf Sugar, or Strawberry; but the tall varieties well repay bushing. Enduring considerable cold, the early peas should be put in by the first of April—in some seasons by the middle of March. It is a good plan to place a board edgewise on the north side of the rows. The late sorts may be sown the middle of April, May, and June to keep up a continuous supply, though when covered deep in dry, light soil, or afterward banked up some inches, they will continue to yield pods for a long time. Some sow broadcast, but we want everything in rows or drills that they may the more readily be kept free from weeds. Sow on deeply-worked but not over-manured ground, scooping out the width of a hoe six inches deep, the rows three feet apart for dwarfish sorts, and four feet for tall kinds. Scatter in quite thickly the dwarfs about one inch apart in each direction, and the Champions two inches. This is much thicker than usually advised, but a trial will show its advantage in an increased yield. Cover with two inches of the soil and insert the brush. Continue to return the earth as the peas grow until the ground is level or even

ridged up against the vines. They will be less liable to mildew and bear longer for having the roots so far below the surface.

Saving Seed.—Peas for seed should be picked as soon as they attain full size, before the pods begin to turn, and dried in the pod. Peas dried in this manner will bring peas the next season from ten days to two weeks earlier than if allowed to ripen on the stalk, and the same rule applies to beans, corn, and almost all garden vegetables.

Potatoes.—A few early potatoes of the earlier and better sorts, should be planted in the garden, to be handy for the kitchen. Plant in rows two and a half feet apart, drilling in halves, or, if large potatoes, quarters, one foot apart, and cover with three inches of soil. Unless the ground is rich scatter some manure in the furrow, or otherwise opened drill. Plant from first to middle of April.

Sweet Potatoes may be raised successfully by setting out the plants obtained from a grower. To prevent a long straggling growth spread rows of manure, three feet apart, and turn furrows or throw earth over it with a spade, forming ridges six inches high of fine soil. Set the plants fifteen inches apart along these ridges, and keep well hoed, earthing up in the early stages of their growth. Lift the vines a few times when they incline to root. Set the plants from the 10th to 20th of May. The slips for setting out may readily be obtained by planting the tubers in a hot-bed from the 10th to the 15th of April. Dig down and carefully break off the shoots close to the potato, replacing the earth for a second crop of sprouts. Transplant in wet weather if possible.

Radishes.—A rich, light, dry, and sandy loam is the best soil for the early crop; a deep moist soil for the later crops. Sow them each fortnight from the earliest opportunity in the Spring until August. There are several kinds, the Early Black, Scarlet Short Top, Early Salmon, Olive Shaped, and the White and Turnip varieties. The Black Spanish is a Winter radish, in turnip form; sown in August or September, dug in October, and stored away in the cellar for Winter use. It will keep good until the ensuing April.

Radishes may be grown in Winter by soaking the seed in water twenty-four hours and then hanging them in a bag in the sun a day or two until they germinate. Then sow in a half barrel filled with rich earth, place in the

cellar and place another half barrel over them. Water occasionally with lukewarm water.

Rhubarb or Pie-Plant.—All sorts may be raised either from the seed, or by dividing the roots, splitting them vertically, and giving to each piece from one to three eyes and a bud on the crown. Plant in deep, rich, light, moist soil, with plenty of well-rotted manure worked in; and in rows five feet by three, for the larger varieties, and three feet by two for the smaller ones. The ground around the roots ought to be carefully and deeply dug, without unduly mutilating them. After a few years, when the stalks begin to dwindle in size, they should be dug up, and replanted as at first. Some never allow the flower-stalks to produce flowers; and others cut them over as soon as they have done flowering, to prevent the plants from being exhausted by the production of seeds. The former seems the preferable method, as the flower-stalks of plants can not, like the leaves, be considered as preparing a reserve of nourishment for the roots.

The mammoth varieties are deemed more coarse, and hence less desirable for cooking purposes, than the smaller kinds, though yielding more wine; but truth extorts the confession, that rhubarb wine, if not actually deleterious, is far less palatable than the wines produced from currants, berries, and grapes. The *Tobolsk* is the earliest variety, small and excellent; the *Washington*, *Myatt's Victoria*, and the *Scotch*, are among the best for productiveness and flavor.

A correspondent of the *Indiana Farmer* expresses the opinion, based upon experiment, that the use of ashes as the manure for the pie-plant, produces a more delicious plant than any other mode of culture; not being as sour, but containing just enough acidity to make it pleasant. The reason given for this is, that the acid peculiar to the rhubarb is neutralized, in part, by the alkali of the ashes.

Taking the Stalks.—Remove a little earth, and, bending down the leaf you would remove, slip it off from the crown without breaking, or using the knife. The stalks are fit to use, when the leaf is half expanded; but a larger produce is obtained by letting them remain till in full expansion, as is practiced by the market gardeners. The stalks are tied in bundles of a dozen and upward, and thus exposed for sale.

Salsify, or Oyster-Plant.—This hardy perennial vegetable, like pie-plant, is

more highly esteemed the better it is known, and it certainly affords a very good vegetable substitute for the real bivalve. It succeeds best from early sowing, as the seeds best vegetate when the earth is moist. Sow from the middle of April to the middle of May, in deeply-worked, rich soil, in rows a foot apart, cultivating them the same as parsnips or carrots. About the beginning of October the roots will be ready for use; but they are best in the Spring, after standing in the ground during the Winter, with or without a covering; but a few should be buried in the earth, or covered with sand in the cellar, for use while the ground is frozen. The black variety is most prized by the Germans.

The roots are prepared for the table by various methods. They are often stewed, and made into soup; sometimes parboiled, sliced, and fried in batter; they also form an admirable garnish for boiled fowls or turkeys; and when simply boiled like beets or turnips, the flavor is sweet and delicate. The young flower-stalks, if cut in the Spring of the second year and dressed like asparagus, resemble it in taste and make an excellent dish. The roots sliced and served with vinegar, salt, and pepper, are eaten as salad. For persons of consumptive tendency, this vegetable is highly recommended.

Skirret.—This hardy perennial, the *Crummock* of the Scotch, is cultivated for its groups or bunches of roots joined together at the crown or neck of the plant. These roots are oblong, fleshy, and very sugary, measuring six or eight inches in length, and nearly an inch in diameter. The plant is raised from seeds, in light, mellow soil, in drills a foot apart, thinned to five or six inches, or propagated by slips or suckers. The roots need to be dug and stored in the cellar, in sand, for Winter; and when cooked and served as salsify, they are regarded as the sweetest and whitest of esculent roots, affording a considerable portion of nourishment. Their cultivation in regions where the sweet potato can not be successfully grown, would prove exceedingly desirable. There is but one variety, and it is fit for use in the Autumn.

Spinach.—This furnishes the very best, as well as earliest Spring greens. It endures the Winter with a slight covering of straw, or other litter, and on this account the early crop is sown from the first to the middle of September.

ber, in rows ten or twelve inches apart, half an inch deep, thinning to four inches in the row before Winter sets in. The surplus plants may be used late in the Fall, and the remainder may be uncovered and used during the Winter, if desirable. A thin covering of straw is better than a thick one, which smothers the plants. Uncover as soon as hard freezings are over in the Spring, and when of sufficient size pick off the leaves, and others will soon appear to keep up the supply. For Summer use, it may be sown at intervals of a fortnight, from the middle of March until the middle of July. The round-seeded variety is best for Spring sowing; its thicker leaves are preferable; but the prickly kind is recommended for standing the Winter best.

Squashes.—The Early Bush, or Patty Pan, from its dwarf habit and productiveness, is preferred for the early supply; while the Hubbard, the Autumnal or Boston Marrow, the Acorn or Turban, the Canada Crookneck, the Cocoa-nut, the Sweet Potato, the Vegetable Marrow, and the Yokohama, are excellent Winter varieties. The early kinds require to be planted as early in the Spring as the weather will admit, in hills four feet each way, and the running kinds six to eight feet apart; and all kinds need a warm, rich soil, and the faster they grow the surer they are to outstrip their enemies. They do best on new land, and two or three plants are enough in a hill; all flat-shaped seeds should be planted in a vertical position, and to cover loosely, greatly facilitates their coming up.

The culture of Winter squashes is attracting more and more attention. They should be got in as early as possible, and a rapid growth encouraged. The mealy, delicately-flavored Hubbard; the sweet, fine-grained, salmon-yellow Sweet Potato; the rich, excellent Autumnal Marrow; the sweet, rich, orange-colored Yokohama, so excellent for pies, and other Winter varieties, furnish a superior table vegetable.

Squashes occupy a great deal of ground when suffered to run and have their own way; they do better with their leaders clipped off, letting the laterals grow, and thus increasing their yield. Where a person has but little room, and wishes to economize, a trellis for them to run upon is recommended, and is said to operate very successfully. Stakes or small posts are set up, two feet apart each way, and the seed planted in the center. When the vines begin to run, they are trained upon slats nailed

to the posts, and by throwing boards across the slats the fruit is supported, and will ripen much earlier than when allowed to lie on the ground half covered with leaves. Squashes trained in this way, can be confined to little space, and bear as profusely as when the vines run over the ground.

Before the frost comes the squashes should be picked and removed to some dry, cool place; handling them tenderly, without bruising, and not heaping them up in piles. They preserve best in a dry atmosphere, with a uniform temperature but little above the freezing point.

Tomatoes.—Too much pains can not be taken to get the best varieties, and secure the best cultivation of this invaluable vegetable. The Keyes' Early Prolific, the Early Smooth Red, Orangefield, and Alger, are highly commended for their early ripening and desirable qualities; they appear to be from two to three weeks earlier than the common varieties. The Early York, Maupay's Superior, Cedar Hill Early, Mammoth Chihuahua, Large Yellow, and Fejee are excellent kinds—the Fejee for a late variety.

Mrs. E. D. KENDALL, of Maryland, commends the following mode of securing early tomatoes: A good large turnip is far better than any hot-bed for propagating early tomatoes. Cut off the top, and scoop out to a shell three-quarters of an inch thick. Fill the cavity with rich mold, plant half a dozen seeds, and place the turnip in a box of loam. Keep in a warm room, by a south window, if possible, and sprinkle with tepid water every day until there is no longer any danger from frost, then remove the turnip to the out-door bed, and thin out all but one plant. Should the turnip shell put out shoots, pinch them off, and the shell will soon rot, affording a fertilizer to the tomato plant that will send it ahead wonderfully. A dozen or two of turnips thus *tomatoized* will afford an abundant supply of early tomatoes for an ordinary family.

Those who have green-houses or hot-beds will need no other facilities. But those who have only a stand of parlor plants, and keep up a constant fire, can start a few tomatoes with very little trouble. Take a half dozen four or five inch pots, and plant two or three seeds in each, in rich garden loam. The pots can stand with the other house plants, and receive the same watering and attention. When the plants are well started, pull up all but the most vigor-

ous one in each pot. Stir the earth frequently around them, and they will grow rapidly, and fill the whole pot with a mass of fine roots, by the last of May, when they will probably be in blossom. If they have rich soil and a good exposure on the south side of a wall or fence, they will suffer little check in the transplanting, and you will get tomatoes much earlier than from seed planted in the open ground in April. They should be set in finely-worked soil, four or five feet apart, or in rows the same distance from each other. They should be trimmed from time to time, by pinching or cutting out the secondary shoots above the fruit, leaving enough for fruiting, but the vine should not be defoliated, as the leaves are the life of the plant, as lungs are to animals. The tomato is impatient of wet, and if good and early fruit is expected, too much moisture must not be allowed. Indeed, they will flourish in the driest soil, when once established.

The experience and suggestions of Hon. D. A. COMPTON, communicated to the *Southern Farmer*, are worthy of attention. Farmers, says Mr. COMPTON, should start their plants in small squares of inverted sod in a slight hot-bed. Such plants are moved in perfect safety—are more stocky in habit, and in every way better than plants grown thickly in soil. Early tomatoes are most readily grown on deep sandy soil; but as all farmer's gardens are not sandy, the following method will be found highly advantageous by those whose soil is a heavy loam, approaching clay: Make steep, conical hills, a foot or more in height, and two and one-half feet diameter at the base; in the tops of these set the plants. Water thoroughly and immediately cover the surface of the hills slightly with dry earth, to prevent the ground from baking. The roots will soon spread through every part of the mounds, and being so exposed to the rays of the sun will grow amazingly. Do not be afraid the heat will burn them up—the tomato came from a hot country and will endure heat and drought that would be fatal to northern plants. Should the drought be excessive, and the vines droop somewhat, dust them with plaster. This will attract moisture enough at night to support them during the day, besides furnishing them with ammonia. Hoe and plaster frequently. When the tomatoes are the size of crab-apples, pull off the smallest, and also pinch off the tops of the plants. Let the vines fall and remain directly on the ground, that the fruit may have the full benefit of the heat of the sun and ground. By

this method ripe tomatoes may be had full three weeks earlier than by flat culture in the common way.

It does not pay to let the tomato vine trail on the ground. It delights in the sunshine and air. The fruit decays, and does not ripen upon the earth. A single tomato plant, in New Jersey, properly trailed, obtained a height of nine feet four inches, covering a space of thirty-one feet in circumference, and producing from fifteen hundred to two thousand tomatoes. Brush, cut fine, and placed under the plants before they lop over, is a clean, cheap, and excellent support. The vines may be tied to a single stake, if pains are taken to pinch off the side branches, and lead up a central shoot, which is the French method, and is said to be successful. Trellises of various forms will suggest themselves to every tomato grower. Knock a flour barrel to pieces, take one of the hoops and two of the staves, sharpen one end of them, and nail the other ends to the opposite side of the hoop, set in over the plants, and drive it into the ground. The vines will hang over the edge of the hoop, free from the ground. Set the staves in the next hill at right angles with those in the first, and let the hoops just come together, and tie them with a string in such a way as to support each other. A pile of stones laid around the plant would be excellent, for it would keep the fruit from rotting, would subserve many of the purposes of mulching, and also radiate a good deal of heat to the plant; the tomato is a native of torrid climes and requires heat. The stone pile would admit of the plant taking a natural growth. Grass, straw, or boards will answer—at any rate, put something under the vines to preserve the fruit. A small shrub, having many limbs, may be stuck into the ground by the side of a plant, and it will afford a good support.

The utility of trimming tomato vines is thus strongly urged by an experienced gardener: Keep your vines trimmed to not more than three or four strands. A little attention will enable you to do this in a way that will throw the strength of the plant into the fruit. Fruit-bearing branches never put out immediately over a leaf. When the tomato is in blossom, this can be readily observed. The branches which put out directly over the leaf or strands of vines, should be pinched out with the thumb or finger, except three or four you wish to train up, you can have the fruit greatly improved in both quality and quantity.

The French method of raising tomatoes is

worthy of a passing notice: As soon as a cluster of flowers is visible, the stem is topped down to the cluster, so that the flowers terminate the stem. The effect is, that the sap is immediately impelled into the two buds next below the cluster, which soon push strongly and produce another cluster of flowers each. When these are visible, the branch to which they belong is also topped down to their level; and this is done five times successively. By this means, the plants become stout dwarf bushes not above eighteen inches high. In order to prevent their falling over, sticks or strings are stretched horizontally along the rows, so as to keep the plants erect. In addition to this, all the laterals that have no flowers, and after the fifth topping, all laterals whatsoever, are nipped off. In this way the ripe sap is directed into the fruit, which acquires a beauty, size, and excellence unattained by other means.

The popular belief, in the language of Professor RAFFINESQUE, of France, that the tomato "is everywhere deemed a very healthful vegetable, and an invaluable article of food," is well sustained by facts and experience. The distinguished Dr. ROBLEY DUNGLISON says: "It may be looked upon as one of the most wholesome and valuable esculents that belong to the vegetable kingdom." Dr. BENNETT ascribes to it many important medical properties, acting as a laxative upon the liver and other organs, proving beneficial in cases of diarrhea, and an almost sovereign remedy for dyspepsia and indigestion. The tomato, says HALL's *Journal of Health*, is one of the most healthful as well as the most universally liked of all vegetables; its healthful qualities do not depend on the mode of preparation for the table; it may be eaten thrice a day, cold or hot, cooked or raw, alone or with salt or pepper or vinegar, or all together, to a like advantage and to the utmost that can be taken with an appetite. Its healthful quality arises from its slight acidity, in this, making it as valuable perhaps as berries, cherries, currants, and similar articles; it is also highly nutritious, but its chief virtue consists in its tendency to keep the bowels free, owing to the seeds which it contains, they acting as mechanical irritants to the inner coating of the bowels, causing them to throw out a larger amount of fluid matter than would otherwise have been done, to the effect of keeping the mucous surfaces lubricated and securing a greater solubility of the intestinal contents, precisely on the principle that figs and white mustard seeds are so frequently efficient in

removing constipation in certain forms of disease.

Saving Tomato Seed.—Lay the seeds and pulp upon a dry cloth, spread them with a knife, and then lay another cloth over, and roll all up tight, to free the water; then unroll and scrape off the seeds into a pan of water, and wash out with the hand all the pulp that is left after rolling, and lay the seeds in the dry cloth for a few minutes; then place them on a paper, and in the course of a day they are clean and dry. Another mode is to spread the pulp, containing the seed, thinly upon a newspaper, without washing, and allow it to dry there. Roll up the paper for preservation, and in the Spring cut it up into slips, and plant seeds, paper and all, in a hot-bed, seed-pots, or scooped turnips.

Turnips.—The turnip is accounted a healthful vegetable, though in weak stomachs it is apt to produce flatulency and prove difficult of digestion; while the syrup of turnip, after being extracted by baking and mixed with honey, is a favorite domestic medicine used in coughs, hoarseness, and other asthmatic disorders. The Early White Dutch or Strap-leaved, is a very early kind; and the Early Red Top Dutch or Strap-leaved Red Top, and the Early Yellow Dutch, are desirable varieties—the latter is quite firm, sweet, round in form, and a good keeper. Sow in drills two feet apart, covering one-fourth of an inch, from the middle of April to the middle of May for early, and from the middle of July to the middle of August for late Fall crops. Thin to eight or ten inches, pulling out the surplus roots for use when half grown. The turnip delights in a light, rich soil.

Watering Garden Plants.—Vines especially, in a season of drought, need watering. The principle of capillary attraction applied to moistening the earth around cucumber and other vines, has been practiced with much success. A vessel containing water is placed near the plants, from which is extended a piece of old cloth to the roots of the plant. Thus water is conveyed from the vessel to the plant slowly, keeping the ground constantly in a good degree of moisture. One vessel, with its different cloth tubes, thus answers for several hills. This method is preferable to pouring on water, which, to some extent, flows off and hardens the ground, sometimes injuring the vines more than if they had received no water at all.

Another method, perhaps equally good, is highly commended by those who have practiced it. Set a barrel with both heads out in the ground half way, and partly filled with manure. Around the outside of the barrel, in properly prepared soil, the cucumber or other vine-seeds are planted. All watering is done through the barrel and the manure. The water thus reaches the roots from beneath, and keeps the soil moist and rich. By either method here mentioned, the vines are more thrifty than those treated in the ordinary way.

THE FLOWER GARDEN.

"I wish," exclaimed the late Rev. Dr. J. O. CHOULES, "that we could create a general passion for gardening and horticulture. We want more beauty about our houses. The scenes of our childhood are the memories of our future years. Let our dwellings be beautified with plants and flowers. Flowers are, in the language of a late cultivator, "the playthings of childhood, and the ornaments of the grave; they raise smiling looks to man, and grateful ones to God."

"A garden," says DOUGLAS JERROLD, "is a beautiful book, writ by the finger of God; every flower and every leaf is a letter. You have only to read them—and he is a dunce who can not do that—and join them, and then go on reading and reading, and you will find yourself carried away from the earth to the skies by the beautiful story you are going through. You do not know what beautiful thoughts—for they are nothing short—grow out of the ground, and seem to talk to man. And then there are some flowers that always seem to me like over-dutiful children; tend them ever so little, and they come up and flourish, and show, as I may say, their bright and happy faces toward you."

A writer in the *Farmers' Magazine* says that the pleasures arising from the culture of flowers are harmless and pure; a streak, a tint, a shade, becomes a triumph, which, though often attained by chance, is secured only by morning care, by evening caution, and the vigilance of days. It is an employment which, in its various grades, excludes neither the opulent nor the indigent; teems with boundless variety, and affords an unceasing excitement to emulation, without contention or ill-will.

"Who can forget," asks a thoughtful writer,

"the vine planted by his mother's own hand when he was a little child? Its tendrils now cling to the topmost branches of a tall tree in the front yard; and he never revisits the scene of his childhood without gratifying some of the holiest emotions of his nature, by sitting under its shelter, and recalling the earliest and happiest associations of his life. And there, too, clinging about the columns of the porch, is the coral honeysuckle, shading the evening window with its rich and delicate clusters of flowers; and at every footstep along the border are the many-hued flowers set there by a sister.

"It has been said by travelers that they could distinguish a pure-minded and intelligent family from the appearance of the house and grounds in this particular. The difference was striking—the house of the more intelligent was surrounded with flowers—the windows displayed them—vines were twined with care and taste over the dwelling. Another presents a different spectacle; the weeds and briars are allowed to hold their dominion; in short, SOLOMON'S picture of the garden of the sluggard is exactly verified.

"The cultivation and study of flowers appears better suited to woman than to man. They resemble her in their fragility, beauty, and perishable nature. The mimosa may be likened to a pure-minded and delicate woman, who shrinks even from the breath of contamination; and who, if assailed too rudely by the finger of scorn and reproach, will wither and die from the shock."

Flowers are, of course, extensively used at weddings, but, according to the florists, they are employed more liberally at funerals. Five hundred dollars are not unfrequently expended in crosses and wreaths for these solemn occasions. As weddings and funerals require white flowers chiefly, they cause these to be more rare and of higher price than colored ones. Some of our churches, of late years, have employed flowers extensively on occasions of religious festivals. Their culture is a healthful recreation—healthful both to the body and mind. The maiden, the invalid, the child, the care-worn man, feel, as they bend over their flowers, that they have something to engage their attention—something to protect—something to cherish. The delicate, sensitive plant, the gorgeous passion-flower, the pure lily, the brilliant rose, the beautiful tulip, all are objects of wonder, splendor, and loveliness. The heart is improved, and the coarser features of human character softened. It is innocent

and pleasant. The time thus spent will cause no sigh of sorrow—no tears of regret.

If music has charms to soothe the savage, flowers have influence to subdue the ravings of the maniac. Some of the severest cases of insanity in men brought to the Michigan Insane Asylum in irons, and manifesting the most violent symptoms, have been suddenly calmed down to a condition bordering on sanity, by the simple presentation of a bouquet of flowers.

The following plan of a flower-garden, taken from the *Country Gentleman*, evinces taste, and is susceptible of such changes as circumstances may suggest:



The best style for a flower garden, both for beauty and economy, is to extend a gravel walk, by a constant and varying curve around a small, closely-shaven piece of lawn, cutting the flower beds in circles, ellipses, or arabesque forms, as shown in the figure—a being the dwelling, and b the summer-house or seat; the white portion is the grass, which should be mowed at least once a week, and never allowed to grow more than two inches high. Such a flower garden as this may be kept in perfect order at one-fifth the expense of one with the whole surface cultivated. The size may be varied indefinitely.

Preparation of Flower Beds.—L. L. FAIRCHILD, of Wisconsin, an experienced cultivator of flowers, gives these directions: Mellow up the soil to the depth of the spade and throw it on one side: Then spade down again the depth of the blade, making it very fine and mellow. Return the surface soil. This gives a depth of eighteen inches or over. If the soil is not rich it should be made so by the addition of finely pulverized, well rotted manure. Leaf mold from the woods and fence corners answer a good purpose. If the soil is heavy it should be made light by the addition of sand and de-

cayed vegetable matter. Be sure and have your beds finely pulverized, and soil sufficiently lively so that it will not become hard baked. The after culture needed will be sufficient to keep the beds entirely free from weeds and the surface from hardening. On beds made as described, you may sow your seeds with the assurance of satisfactory results.

Sowing the Seeds.—In order to be successful in raising flowers from seed, it will be necessary to bear in mind that the smaller the seed the less deeply it should be covered with earth. Some seeds are so small that they require only to be sprinkled over the ground and gently pressed into the soil, and should the weather prove very dry, a thin layer of damp moss ought to be placed over them till they germinate, when care must be taken to have it removed. There are few seeds that require such extreme attention.

Small seeds, as *Petunia*, *Portulaca*, etc., sow about one-eighth of an inch in depth; those of larger size, as *Mignonette*, *Sweet Alyssum*, etc., about one-fourth of an inch in depth; still larger, as *Balsam*, *Morning Glory*, etc., three-fourths of an inch in depth; and seeds of the largest size, as *Lupines*, *Nasturtium*, etc., fully one inch in depth. They must be covered with finely pulverized soil, or leaf-mold, slightly pressed down, and should be kept moderately moist by shading or slight sprinklings of water, until they make their appearance. When about one inch in height the plants must be thinned out from one to two inches apart, to prevent crowding. Tall varieties should be neatly staked to prevent injury from wind or rain.

The time for sowing is regulated by latitude—April and early May for the Middle and Northern States, and some six weeks earlier for the latitude of South Carolina and the Gulf States.

Transplanting and Watering.—In their transplantation, great care should be taken not to place the plants in a soil greatly different from that whence they were removed. Many are very negligent concerning this. They remove a plant from a loose soil and sunny spot to a place where the ground is hard and damp, and then wonder why the plant droops and dies. Plants possess a wonderful power of accommodation, and, by proceeding gradually, almost their very nature may be changed; but one should no more expect that a plant transferred from a sheltered nook to an exposed situation should flourish, than that the animals

of Africa should dwell in Lapland. Plants should seldom be showered by the watering-pot, but their supply should be afforded them by irrigation and damp under-soil. Drenching is decidedly hurtful, for though it may cool the earth, and apparently revive the plant, yet, the rapid evaporation that takes place from the leaves will generally cause the plant to languish. Plants, moreover, should be watered very regularly, for nothing will sooner destroy them than to soak them for one day, and then neglect them for a week.

Shaded Flowers Last Longest.—The *Gardener's Journal*, an English periodical, recommends shading flowers while blooming, in order to continue them in blossom a much longer time than otherwise. "The practice of shading plants," says this journal, "from the direct rays of the sun, receives an illustration on a broad scale, in the exhibition of American flowers in Regent's Park, London, the result of which is that the plants, which, in the open air exposed to the sun, would last in perfection two or three days only, continue here, shut out as they are from the sun, and exposed to a damp, cool, and still atmosphere, no less than a month, and some of them still longer. This, then, is the result of shading plants while in flower. In all cases where it is possible, the shade ought to be movable, so as to be taken down at pleasure." If shading in the cloudy and damp climate of England be of service in prolonging the blooming season of flowers, it must prove much more so in the bright and sunny region of America.

The Coloring of Flowers.—A German botanist has given us these interesting facts, as observed in his own country: The number of flowers invariably increases from December to July. White flowers are the most numerous during the whole period of the year when plants are seen in blossom; after these come the yellow, then the orange, the blue, the violet, the green, and lastly, the indigo flowers, which are the most uncommon. The law, according to which the increase of flowering takes place, shows itself to be closely connected with the mean temperature; but from time to time anomalies are exhibited, which the change of temperature alone can not explain—such as the rapid decrease of the number of flowering plants from the end of July to that of August. From the month of January, when all the flowers are white, to the vernal equinox, the relative number of white flowers rapidly decreases; after that period the proportion in-

creases till the middle of May, and then insensibly diminishes till the time when the frosts arrest all vegetation. If we set aside the very small number of yellow flowers which appear in February and March, we see that the proportion of flowers of that color increases from the beginning of April to the end of June; then it remains stationary till the middle of August, after which it increases again till the frosts come. The proportional number of red flowers gradually diminishes from February till the end of April; then recovers the ascending scale till the end of August, after which it decreases till October; it then rises again till November, when most of the cultivated flowers are of that color. The green or greenish flowers diminish from March till the end of May, and after this the proportion is about uniformly maintained till Winter. Blue flowers increase to the middle of April; then decrease to the Summer solstice; then ascend to the number reached in April, after which they rapidly decrease, and totally cease on the arrival of the frosts. The other colors are not regular enough to admit of the giving of a rule for them. It is seen that each color rises twice and decreases twice. Whenever the white flowers increase, the yellow decrease, and *vice versa*. The red and green always correspond, as do the blue and violet flowers. These laws apply to species, not to individuals. The same botanist finds, that the number of plants opening their corolla during the night is very small, compared with that of those blossoming during the day, being only about twelve per cent.

Arrangement of Flowers.—The Cavendish Society of England recommend that blue flowers be placed next to orange, and the violet next to the yellow; while red and pink flowers are never seen to greater advantage than when surrounded by verdure and by white flowers; and the latter may also be advantageously dispersed among groups of blue and orange, and violet and yellow flowers. Plants whose flowers are to produce a contrast should be of the same size, and in many cases the color of the sand or gravel walks, or beds of a garden, should be made to conduce to the general effect.

To Change the Color of Flowers.—If the stem of a white rose be placed in a solution of yellow prussiate of potash for four or five hours, and then placed in a solution of sulphate of iron, the color will be changed to a delicate primrose, while the fragrance remains unchanged.

Effect of Charcoal on Flowers.—"About a year ago," says a writer in the *Paris Horticultural*

Review, "I made a bargain for a rose-bush of magnificent growth and full of buds. I waited for them to blow, and expected roses worthy of such a plant, and of the great praise bestowed on it by the vendor. At length, when it bloomed, all my hopes were blasted. The flowers were of a faded color, and I discovered that I had only a middling multiflora, stale-colored enough. I therefore resolved to sacrifice it to some experiment which I had in view. My attention had been captivated with the effects of charcoal, as stated in some English publication. I then covered the earth in a pot in which my rose-bush was, about half an inch deep with pulverized charcoal. Some days after, I was astonished to see the roses, which bloomed, of as fine and lively a rose color as I could wish. I determined to repeat the experiment, and therefore, when the rose-bush had done flowering, I took off the charcoal, and put fresh earth about the roots. You may conceive that I waited for the next Spring impatiently to see the result of this experiment. When it bloomed, the roses were at first pale and discolored; but by applying the charcoal as before, the roses resumed their rosy-red color. I tried the powdered charcoal likewise, in large quantities upon my petunias, and found that both the white and the violet flowers were equally sensible of its action. It always gave greater vigor to the red or violet colors of the flowers, and the white petunias became covered with irregular spots of a blueish or almost black tint. Many persons who admired them, thought they were new varieties from the seed. Yellow flowers are, as I have proved, insensible to the influence of charcoal."

Annuals.—Annual flowers are such as either blossom and seed within the same year, or winter-kill by exposure; some of the hardy varieties of which, however, like the larkspur, candytuft, etc., may be made in a sense biennials, by sowing them late, and protecting and wintering the young plants for blossoming the following year; and some of them, as the mignonette, become perennial when propagated from cuttings, and not permitted to ripen their seed. Very far from a complete list is herewith given of the annual or other varieties, as we prefer to notice such only as have been pretty well tested and accredited, and such as would give variety and beauty to the flower garden. The candytuft, dwarf morning glory, lupins, malope, poppies, and Venus' looking-glass, never do well transplanted, and

hence should always be sown in the bed where they are to remain. Many fail in their culture of annuals simply because they suffer them to crowd and choke each other. They require thinning. The larger kinds, as balsams, do best when standing separately, and never less than a foot apart. May-sown annuals of many kinds, with plenty of room, will continue to flower until frost comes, while if grown too thick, they soon exhaust the soil, cease flowering, and prematurely decay.

Abronia Umbellata.—A beautiful annual, with long trailing stems, bearing clusters of elegant flowers, rosy lilac, with white center, highly and deliciously fragrant.

Acroclinium.—One of the best of the everlasting flowers. Colors, white and rose.

Ageratum, or *Never-Growing-Old*.—Flowers remarkable for their soft, rounded, fringe-like appearance, the plant hardy and ornamental, and suitable for beds or borders.

Amaranthus Tricolor.—Its beautifully variegated foliage of red, green, and yellow, is much admired. It is a tender annual. A new species, the Globe Amaranth, with its reddish orange flowers, is an important addition to this class of "immortals."

Animated Oat.—Grown as an object of curiosity; when they have shed their seeds, the strong heads are singularly sensitive to the changes of the atmosphere, and continually in motion; when wet, they seem to twist about and appear singularly animated.

Arctotis.—Produces a brilliant yellow flower, opening to the sun, and closing at night. It has a succession of blossoms through the season, which makes it a desirable border flower.

Aster.—There are many varieties of this hardy annual, the China aster. The Peony-flowered aster, has a very full, double flower, nearly as large as a medium-sized dahlia, and much handsomer in the estimation of good judges of flowers; the German Globe Pyramid aster; the German Quilled aster; French Globe aster, similar, to the German, but differing in their growth; German Dwarf aster, eight or ten inches high, completely covered with flowers; Dwarf Bouquet aster, very beautiful, each plant forming a perfect bouquet. The aster is nearly as showy as the peony, and makes a fine Autumn flower. Plants should be eighteen inches apart.

Balsam, or *Touch-me-not*.—This half-hardy family is divided into early, late, dwarf, tall, camellia-flowering, of which there are about a dozen beautiful varieties of the latter alone,

large, double, resembling roses, or medium-sized camellias—the colors very brilliant, scarlet, crimson, violet, purple, rose, white, and various spotted, striped, and mottled kinds. The plants should be set ten or twelve inches apart, in rows three feet asunder; and the side branches may all be pinched off, leaving only the center shoot, or three or four branches may be retained. It commences its flowering in July.

Blue Pimpernel.—A dwarf trailing plant, with blue and pink flowers in July and August. It has been termed the Poor Man's Barometer, as it closes its flowers when exposed to damp air, as do the chickweed, and many other plants, upon the approach of rain.

Calandrinia Grandiflora.—A half-hardy annual, two feet high, with rosy-purple flowers, in vast profusion, from June to October.

California Gold Flower, or Poppy.—Grows two feet high, blooming from June to September, of a brilliant shining yellow, producing a great degree of splendor when the full sun shines upon it, giving it a perfect blaze of color and attractiveness.

Calliopsis, or Coreopsis.—This annual is hardy and showy, and is known as the elegant coreopsis. There are a number of beautiful varieties, and all highly ornamental, bearing a profusion of flowers of rich brilliant crimson, and other colors.

Candytuft.—There are several varieties of this beautiful, hardy, free-blooming annual—the so-called crimson ones are not really crimson, but of a purplish color; other varieties are of a pure white, flesh-color, lilac, and rose appearance. The Fall-sown seeds flower early; while those sown in April flower from July till frost appears. Thin out the plants in the bed to about four or five inches apart.

Crysanthemum.—One of the handsomest of Autumnal flowers; the dwarf varieties are hardy, and the colors brilliant and varied. For Autumn blooming, there is nothing to supply their place. Plants are easily obtained from cuttings, or by root divisions, set about ten inches apart; an old stool of the last year furnishing a large supply. If placed in the garden, they require a warm and sheltered situation; in large-sized flower pots they produce a decorative effect in the drawing room or conservatory.

Clarkia Elegans.—A hardy, showy annual, bearing a profusion of flowers of delicate colors; they do not stand the heat of our American Summers very well, but frequently flower magnificently during the Autumn months, even

after pretty hard frosts. The plants should be set some ten inches apart; they attain the height of a foot.

Cleome.—A very pretty, free-flowering, half-hardy annual, with curiously constructed flowers; easily raised from seed, in open ground, blooming from July to September; plants eight to ten inches apart; grows about eighteen inches high.

Clintonia Elegans.—A tender annual, of rich blue flowers, and delicate foliage, blooming freely in July and August; six inches high.

Collinsia.—The two-colored, and large flowering varieties, hardy, with white and light purple flowers, numerous and pretty during Summer, not very showy; one foot high.

Cockscomb.—A tender annual, the scarlet and crimson varieties are very brilliant. The plants should be started in a hot-bed, or they can not be raised in perfection. The dwarf kinds are best, and all are suited for potting.

Everlasting Flower.—A family of beautiful plants, whose flowers, if gathered when first open, and carefully dried, preserve their color and shape, for mantel bouquets and ornaments, for a long time. The *Rhodanthe*, *Gomphrena*, *Helichrysum*, *Helipterum Sanfordii*, and *Zeranthemum*, are among the finest of the everlasting varieties—a single plant of the *Rhodanthe* having produced hundreds of flowers, remaining in blossom three months.

Fading Beauty, or Morning Bride.—An annual plant, from Spring-sown seed, producing handsome flowers, which last but a few hours.

Gilia.—There are three hardy and pretty varieties, the blue, tri-color, and large blue. The flowers are delicate, some of them white; when single, not very showy; grows from one to two feet high.

Ice Plant.—A well-known annual, to be sown early in pots; the plant has the appearance of being covered with ice. Is very ornamental in vases and gardens.

"With pellucid studs the Ice-flower gems
His tiny foliage, and his candied stems."

Jacobia, or Senecio Elegans.—Of several kinds and various colors, producing a beautiful appearance.

Job's Tears.—A kind of ornamental grass, attaining a height of two or three feet, producing a shining, pearly fruit, which, when suspended on its slender pedicles, is supposed to resemble a falling tear. The flowers are destitute of beauty.

Larkspur.—A well known, beautiful and hardy flowering plant, of no fragrance, but

making a pretty appearance. It is raised from the seed, or by dividing the roots; if from seed they should be sown in the Autumn, or very early in the Spring, where they are to remain. The prevailing colors are blue, white, and pink—the flowers borne on long spikes. The Rocket Larkspur varieties are superb. The dwarf sorts are admired for their beautiful and varied mass of flowers, and should stand some five or six inches apart; the larger varieties requiring three times as much space.

Love-Lies-Bleeding.—A hardy variety of the Amaranth family, with blood-red flowers, which hang in pendant spikes, and, at a little distance, supposed to resemble streams of blood; flowering in July and August, and growing from three to four feet high.

Lupins.—There are many varieties; should be planted an inch deep in April or early May, grow from one to three feet high, with their delicate foliage, large blue, yellow, and white flowers, from July to September—very conspicuous and showy. Do not transplant well.

Malope.—A very fine and showy half-hardy annual. Sow in hot-bed, or as early as may be in the open ground; plants grow two feet high, and should be about eighteen inches apart; flowers resemble those of the hollyhock. The *Grandiflora* variety has large purple flowers; the *Alba*, pure white.

Marigold.—There are many varieties of this half-hardy and very showy annual, which flowers from early Summer until frost. The African is the tallest, generally reaching two feet; the Striped French is rich, and perfect beyond comparison; the *Signata Pumila* forms a dense mass, round as a ball, with flowers single, bright yellow, marked with orange.

Mignonette.—This fragrant, hardy little annual is everywhere a favorite, blooming and sending forth its sweetness from June till the close of the season. Deserves a place in every collection of flowers.

Mimosa, or Sensitive Plant.—Sow seed in open ground in May, in rich soil. This singular plant is most irritable in the greatest heat, and closes its leaves at the slightest touch.

"Weak with nice senso the chaste Mimosa stands,
From each rude touch withdraws her tender hands."

Mourning Bride.—This is a very showy half-hardy annual, the blossoms varying in their colors from almost black to white, and making fine table bouquets and ornaments. The Double Dwarf Scabious variety is new and attractive. Sow in May; it blooms in latter part of June.

Nemesia.—A pretty, free blooming half-hardy

annual, producing numerous curious and delicate flowers. Should be planted in masses, four inches apart; grows about eight inches in height.

Petunia.—A favorite and hardy annual, the improved varieties of which are splendid. Sow early, in hot-bed or open ground. One of the most effective flower beds is one made wholly of petunias. Make the bed, say six feet long and four feet wide, and oval in shape. Let it be three inches higher in the center than at the edges. Sow seeds of the crimson and white equally mixed together. The plants should be thinned out to six inches apart. They will make a brilliant show all Summer.

Phlox.—There are many varieties, and nearly as many tints and colors—some of extremely delicate coloring, while others are brilliant, constant, dazzling. The *Phlox Drummondii* is the favorite variety. The plants require good rich soil, and to be set a foot apart—if too crowded, they will mildew; will grow fully eighteen inches in height, but have not strength, without support, to stand entirely erect.

Poppy.—A showy, hardy annual, single and double, with white, red, and mixed colors. Some of its varieties are perennial. The double varieties are extremely brilliant, and attain a height of about two feet. The single *Opium Poppy* is large, white, and very attractive.

Portulaca.—Perfectly hardy, producing a profusion of salver-shaped, crimson, purple, yellow, white, and striped flowers. Sandy soil, and a warm situation, furnish the best conditions. Massed in beds on the lawn, or made to adorn mixed borders, the portulaca shows to great advantage. It bears transplanting well, and the plants should be six inches asunder. The Double Rose-flowered is a charming variety.

Primrose.—There are several species and varieties of this well-known hardy annual; all are easy of cultivation, producing rich purple flowers in July and August.

Prince's Feather.—A hardy plant of the Amaranthus family; attains a height of four or five feet, with numerous heads of purplish crimson flowers, well adapted for black or mixed borders.

Scarlet Tassel Flower.—A pretty, half-hardy annual, sometimes called *Venus*, or *Flora's Paint Brush*, with small, scarlet and orange tassel-shaped flowers, exceedingly useful for cutting. Plants should be six or eight inches apart.

Sensitive Plant.—Same as *Mimosa*.

Sportia Californica.—A very showy, hardy, annual, with yellow flowers.

Splendid Gazania.—One of the newly introduced, and one of the most showy bedding plants; the blossoms, with various tints, from rich to four inches in diameter, resembling rich, golden orange chrysanthemums.

Stock, Stockgilly, Gilliflower, or Ten-Weeks.—The annual variety, which is half-hardy, is usually called Ten-Weeks, propagated from seed only, producing a showy and fragrant flower from June to November. The German sorts are much esteemed for the great variety of their color and size. Soil deep and rich; plants twelve inches apart.

Sweet Alyssum.—A hardy, free-flowering annual, blooming the whole Summer, suitable for beds, and edgings; plants should be set five or six inches apart. Very fragrant; flowers pure white.

Venus' Looking-glass, or Campanula.—There are several varieties of neat, hardy, free-flowering annuals, producing a long succession of blue flowers of some beauty; massed in beds, or in borders a foot apart. The form of the corolla resembles a little round, elegant mirror—hence the name. Some of the varieties are showy perennials.

Verbena.—A half-hardy annual, flowering from seed sown in May in the open ground, or propagated from cuttings of the young shoots, placed in sandy soil, which will root in a few weeks. There are many varieties of this lovely family of perpetual flowering plants, embracing every shade of color, from the richest scarlet to the purest white—and several of them are exquisitely scented. The brilliancy and great variety of the colors of the verbena, and its adaptedness to our hot Summer sun, and its long continued season of bloom, render it the most valuable of all bedding plants; but to succeed well, in-doors or out, it must be fully exposed to the sun, and will not thrive without it. It requires but very little water in Winter, and should be kept in a dry airy place till time for repotting in the Spring; and started in pots, verbenas will bloom from May to November. Sown in masses, they are very ornamental in the lawn. If the aphid or green fly appears, tobacco fumigation is the remedy.

Whitlavia.—A hardy and elegant new annual from California, producing very beautiful dark blue bells, in continued succession, from June to October. A light sandy loam; transplants well, and endures the driest season.

Zinnia Elegans.—The new double-flowered

variety, as double as the Dahlia, thrives well in our climate, and is easily transplanted from the hot-bed, which should be done early, twenty inches apart each way; grow over two feet high. A very showy plant, with many-colored flowers.

Biennial and Perennial Flowers.—A few of the more important must suffice:

Alyssum, Rock or Golden.—Raised from seeds or slips; dwarf habit; flowers of a brilliant golden yellow.

Aster, or Star-Flower.—There are many varieties, mostly perennials, bearing a profusion of blue, purple, or white flowers; one of the best is the New England, growing three or four feet high, with large purple flowers, and the Multiflora is also a very fine variety. They may be removed, even when in blossom, provided the plant is cut down to the ground.

Candytuft, or Iberis.—This is the only species of perennial candytuft, yielding a profusion of pure white flowers in June and July. Propagated by layers or cuttings.

Canterbury Bell.—A species of the Bell-flower, hardy, free-bloomer, and of great beauty, single and double varieties—white, blue, lilac, and mixed colors. Being a biennial, it will be necessary to sow seed every year. The plants should be set in August or September where they are to bloom the following year. The Pyramidalis is a large variety, three feet high.

Columbine.—A showy, beautiful, and hardy perennial, with curious, various-colored, and striking flowers, some quite double, blooming early in the Summer.

Chrysanthemum, Chinese.—A hardy perennial, very desirable for late bloom, and pretty withal, grown by dividing the roots; stands the Winter without covering, but best cultivated in pots where it can receive protection when in bloom in severe weather in Autumn. There are two varieties—one scarcely a foot high, the other two feet, some double, and both of various colors.

Daisy.—This small, delicate, perennial plant produces attractive flowers, even through the Winter, if potted and kept in the house. There are several varieties, all hardy, yet needing Winter protection. Propagated by dividing the roots.

Dielytra, Showy.—This is regarded as one of the finest perennials in cultivation; grown by dividing the roots, and so hardy as to require no Winter protection. The stalks are literally

gemmed with bright, rose-pink, heart-shaped flowers.

Dwarf-Fringed Agrostemma.—The name signifies "the crown of the field," indicating the striking and showy character of the flowers, somewhat resembling the pink, but usually growing on taller plants. Hardy, and should be set six inches apart.

Forglove.—A showy and hardy perennial, adapted to a border, with its beautiful spikes of purple thimble-shaped flowers. Raised from the seed, or by dividing the roots.

Gaillardia, Painted.—A handsome, half-hardy plant, naturally a perennial, but will produce its flowers the first year from the seed, if started early. Needs Winter protection. Has large, beautiful, crimson and orange flowers in August. Set eight or ten inches apart.

Garden Angelica.—Raised from the seed; bold and showy when in flower.

Gaura.—A fine perennial, blooming from the seed the second year; and the first year even, if sown early. Very handsome for bouquets, and has the merit of long continued flowering.

Gentian.—A handsome, upright, barrel-shaped perennial, with an exceedingly fine pale blue flower, with delicately fringed edges. Propagated from seed; shady or moist situation best.

Geranium.—There are many varieties of this much admired plant; propagated by cuttings. The Scarlet Geraniums, with their brilliant colors, are highly ornamental. This is one of the choice flowers of the American garden.

Heliotrope.—There are several species of this plant, only the Peruvianum and Intermedia are universal favorites, and particularly worthy of cultivation for their light and dark lilac flowers with their exquisite fragrance. Increased by cuttings.

Hollyhock.—This fine biennial has been much improved of late years, and the double varieties present an attractive appearance in situations suitable for tall flowers. Obtained from seed, or by dividing the roots.

Humea Elegans.—The young plants should be started under glass; a beautiful biennial, growing about four feet high.

Indigo Plant.—This is one of the most beautiful of native herbaceous plants, taking care of itself when once planted; grows two feet high.

Ipomopsis.—An elegant free-growing, half-hardy biennial, with long spikes of rich orange and scarlet flowers; grows three to four feet high; difficult to Winter, doing best in a dry place, without too much protection.

Iris, or Fleur-de-lis.—Many of this extensive family are bulbous-rooted; some otherwise, and all are more or less elegant, delicate, and variegated. Hardy; propagated by dividing the roots.

Larkspur.—The perennial larkspur, with its dazzling blue flower, is one of the finest and most desirable of the hardy herbaceous plants.

Lily.—The family of Lilies are all splendid. The Lily of the Valley, an elegant, delicate, sweet-scented plant, has been for ages a favorite flower, succeeding best in the shade. The White Lily grows three or four feet high.

Monkshood.—There are several varieties of this hardy and handsome perennial, sometimes called Turk's Cap; with long spikes of showy flowers, resembling in form an old cavalry hat. Propagated by dividing the roots; grows about two feet in height.

Pansy, or Violet.—This is properly a biennial, one of the earliest of Spring flowers, single and double, of dwarf habits; propagated by cuttings or divisions of the root. It requires a shady situation and Winter protection. Its tri-colored flowers are rich and brilliant, blooming early and long.

Phlox.—There are many perennial varieties, improved within the past few years, now very superb; among them the Beppo, the Speculum, Suaveolens, Grandiflora, and Virgilia, with their various colors often delicately blended in the same flower.

Pinks.—This splendid genus of hardy perennials has many varieties; propagated from seed or division of roots; plants from six to twelve inches apart, according to size and kind. The Chinese has been greatly improved; the Japan, or Heddewigii, or Double Diadem, is among the richest—rose, purple, and marbled in color; the Flore-pleno, very large magnificent double flowers; the Carnation, the most splendid, and delightfully fragrant of all the Pink family, rivaling the rose; the Picotee, more delicate in its coloring than the Carnation; and the Sweet William, with its double varieties of exceedingly beautiful and various-colored flowers. It is safe to give pinks Winter protection north of forty degrees of latitude.

Poppy.—A showy, hardy perennial, with large, bright single and double flowers. Seed may be sown in the open ground.

Primrose.—A class of very early and pretty dwarf flowers, including the Cowslip and Polyanthus; needing Winter protection; propagated by dividing the plant when done flowering for the season.

Rocket.—A fine, early Spring-flowering plant, very fragrant, excellent for bouquets; grows freely, about eighteen inches in height; hardy; the double varieties, white and purple, are really superb. Very fragrant, flowering in long spikes in May and June.

Snap-Dragon.—There are many varieties, mostly biennials or perennials; raised from seed or division of roots, with various colors, white, yellow, purple, rosy, red, crimson, mottled, etc. The flower bears a resemblance to the snout or nose of some animal; and by applying the thumb and finger to the side of the corolla it opens and shuts as with a snap or spring.

Tritonia Uvarea.—A noble perennial, requiring Winter protection.

Zauschneria Californica.—An elegant herbaceous perennial; grows in bunches, producing a brilliant scarlet, trumpet-shaped flower; hardy, with a little protection, in light sandy soil.

Bulbous Flowers.—Bulbous and tuberous-rooted flowers, among the most magnificent of all of Flora's beauties, are generally easy of cultivation. A light loam, rather sandy, deeply and thoroughly worked and enriched, is best adapted for their culture. As a general rule, when the tops have quite died down, and before very hard frosts, the bulbs may be taken up and separated; they are easily preserved wrapped in paper, and covered in dry sand, or dry saw-dust, and kept in the cellar during Winter, and must not be planted till frost is over in the Spring. The really hardy varieties should be planted in the Fall.

Amaryllis, or Jacobean Lily.—Of great beauty, bright, showy, crimson; plant in May, barely covering the bulbs. Each plant produces but two or three large flowers.

Anemone, or Wind Flower.—Plant in early Fall six inches apart each way, placing the roots the right side up, with two inches of rich soil over them; they need cold-frame or other Winter protection. A very pretty little flower.

Canna.—A handsome half-hardy plant, producing a showy effect the second year from the seed; plant in Spring.

Crocus.—Very hardy, and very early in flowering, with its various colors of yellow, deep and light blue, white with stripes of variegated beauty. May remain in the ground all Winter if covered with litter.

Dahlia.—Capricious but beautiful; propagated by seeds, cuttings, or divisions of the root, which is easily destroyed by frost. Plant first

in pots, and transplant in open ground in May. A yellow loamy soil, with very little manure, seems best fitted for it. There are many varieties, gorgeous in color, sporting into every tint except blue.

Dicentra Spectabilis, or Bleeding Heart.—A hardy, beautiful, and graceful tuberous-rooted plant, with curious pinkish flowers. Propagate by dividing the roots; cover with litter during the Winter.

Four O'Clocks, or Marvel of Peru.—Tuberous-rooted like the Dahlia, and propagated similarly by seed or roots. It is a very attractive flower, of white, purple, yellow, and red-striped colors, admirably adapted for borders.

Gladiolus.—At the head of the list of beautiful Summer bulbs the Gladiolus takes undisputed rank. There are over one hundred varieties, with tall spikes of flowers, brilliant scarlet, crimson, creamy white, striped, and spotted colors. Set in rows in the Spring, a foot apart, six or eight inches asunder, in tolerably dry soil; at different times till the middle of June, to keep up a long succession of flowers.

Hyacinth.—There are more than a thousand varieties of this gorgeous single and double flowering plant, cultivated in Holland, of almost every shade of color. Plant the bulbs eight inches apart, and cover four inches deep; they should be covered with litter in Winter.

Iris, or Fleur-de-lis.—Many of this plant are bulbous-rooted, among them the Persian, esteemed for the beauty and fragrance of its flowers. Plant in October, about two and a half inches deep, and some eight inches apart. Will not stand Winter exposure without protection.

Lily.—There are many varieties of this splendid genus of plants, double and single, white, purple, gold-striped, yellow, orange, and scarlet. The Japan lily, with its hardy roots and crimson-spotted flowers, is scarcely equalled for delicacy and beauty; and though hardy it succeeds best when the ground is well-covered with forest leaves during the Winter. The Tiger lily, the single Candidum, the Chalcedonicum, the Concolor, and the Martagon, are all hardy kinds, and very beautiful. They should be planted from three to four inches deep, according to the size of the bulb, and need not be taken up oftener than once in every three or four years.

Narcissus, or Daffodil.—The Two-flowered narcissus, or Primrose Peerless, and the Jonquil, the Poet's narcissus, are among the varieties, hardy and ornamental. Plant three

inches deep, and cover with litter for Winter protection.

Peony.—Many varieties, and all beautiful, very hardy, and generally standing the Winter even if protection is neglected. The Chinese varieties are celebrated for their large size, delicate coloring, and fragrance. Propagate by dividing the roots—if in the Spring, very early.

Ranunculus.—Our climate is not favorable to the culture of this splendid flowering plant. It needs green-house management in the Winter; yet it has been cultivated in the open air from tubers, well kept during the Winter, planted six inches apart each way and an inch and a half over the crown, in deep-trenched soil, in a cool, moist situation.

Snow Drop, or Galanthus.—A hardy plant, with small bulbs, and the first to blossom in the Spring. Plant in clumps in the Fall, an inch and a half or two inches deep, single and double varieties.

Sun Flower, Double Perennial.—Tuberous-rooted, with numerous large double yellow blossoms, of the size and form of Dahlias. Propagate by planting pieces of its thick, fleshy root in the Spring; grows four or five feet high. Litter for Winter protection.

Tiger Flower, or Tigridia.—Plant the bulbs in May, about two inches deep. The flowers, variegated and gorgeous, are destitute of fragrance, and display their glories but for a few hours, when the sun destroys all vestiges of their beauty; but the plant continues to produce its blossoms for a number of weeks.

Tuberoze.—This beautiful wax-like, sweet-scented, double flower, has a tender tuberous root, and is naturally a green-house plant, but will grow and flower in warm situations in the open air, and especially if first started early in pots. The top of the tuber should be near the surface of the soil. The original bulb will not flower the second time; hence the small bulbs, or offshoots, must be saved for the next year's planting.

Tulip.—The varieties are endless, single and double, early and late. Propagate by bulbs, planted about three and a half inches below the surface, six or eight inches apart, in a deep rich mold. The sorts used for borders may be set in groups of from three to five bulbs, and and covered with litter in Winter.

Climbing Plants and Shrubs.

As the list of this class is extended, a very brief notice only can be given. For trellis-

work in flower gardens, arbors, outhouses, porches, pillars, walls, fences, and for the lawn, climbing plants and vines are highly ornamental.

Balloon Vine.—A half-hardy creeping annual; seed sown early in May; flowers white and green, without any claim to beauty.

Bitter Sweet.—A hardy, beautiful, winding wild climber.

Climbing Lophosper.—Properly a green-house perennial; flowers funnel-shaped, two inches or more long, with purple or crimson colors.

Climbing Staff.—A strong native woody vine, growing vigorously in moist situations and by the side of stone walls; very ornamental when its deep scarlet fruit is ripened.

Corydalis, or Fumitory.—An elegant, indige-nous, biennial climbing vine, propagated from seed sown in April, growing from fifteen to thirty feet in a season, with many pink-white flowers.

Cypress Vine, or Ipomea.—A very tender annual; should be started in a hot-bed; unexcelled in elegance of foliage, gracefulness of habit, and loveliness of flowers.

Everlasting Pea.—A large and beautiful perennial, propagated by sowing seeds, or dividing the roots, flowering profusely the second and succeeding years, with its light purple, pink, or white colors.

Glycine, or Ground Nut.—A hardy, climbing shrub, with long, pendulous branches of blue flowers.

Honeysuckle.—A well-known climbing shrub, growing from fifteen to twenty feet high, producing a succession of flowers during the Summer and Autumn. The Yellow Trumpet honeysuckle—with blossoms the most delicate straw color, all the season—is not half so often seen as it deserves; the Chinese honeysuckle, with deliciously scented, parti-colored blossoms and sub-evergreen foliage, is particularly well suited to verandas with a northern aspect; the Dutchman's Pipe, with a magnificently large dark green foliage, is perfectly hardy, and the most picturesque of climbers, for situations where a bold effect is desired.

Ivy.—English, or Common Ivy, is easily propagated by layers, and is highly esteemed in England as an ornamental evergreen climber, for covering naked buildings or trees, or for training into fanciful shapes. This is a very different vine from our native poisonous ivy.

Jasmine.—A pretty, half-hardy, fragrant runner, requiring training, having no tendrils;

should be laid down for Winter, covered with litter, or banked over with earth.

Loasa.—A curious genus, mostly annuals, running fifteen or twenty feet during the growing season, and blooming in profusion during the Summer and Autumn.

Lycium.—A climbing ornamental shrub, easily propagated from cuttings and suckers, producing handsome violet flowers from May to August.

Madeira Vine.—And excellent climber, with small, sweet-scented flowers, making a fine window-screen, and useful in basket-making.

Maurandia.—An elegant green-house climbing perennial, with rich, purple flowers; may be raised from seed started in the hot-house, and early transplanted to open ground.

Mexican Climbing Cobæ.—A green-house perennial plant, raised from cuttings, rather difficult to keep through Winter, if started in hot-bed, flourishes very well in open air, and has been known to grow two hundred feet in one season, in a conservatory.

Morning Glory.—A free-blooming and beautiful class of hardy annual climbers. Seed may be sown in the open ground early in the Spring. There are many varieties, white, dark blue, rose, violet-striped, and tri-colored.

Myrtle.—An evergreen running vine, including several species, bearing a pretty blue flower.

Nasturtium.—A variety known as the Canary-Bird flower is a beautiful climber, with charming little blossoms, when half expanded having a fanciful likeness to little birds.

Passion Flower.—A tender perennial vine, producing a showy succession of flowers, with something resembling a cross in the middle, surrounded by appendages representing a glory. Raised from cuttings; will not endure exposure to a Northern Winter.

Phlox.—The *Drummondii* variety, of many colors, and the finest of the phlox genus, is a creeping annual.

Pipe Vine, or Birth-Wort.—A singular climbing plant, with brownish purple and somewhat pipe-shaped flowers, propagated from layers and cuttings, and grows from fifteen to twenty feet high.

Purple Hyacinth Bean.—A fine, annual climber, growing from eight to fifteen feet in a season, flowering in clustered spikes, and treated like the common bean.

Scarlet Flowering Bean.—A popular climbing annual, with spikes of showy scarlet flowers, and one variety with white flowers. Plant the

middle of May, and cultivate the same as the common bean.

Schizanthus.—An exquisitely beautiful class of half-hardy annuals, bearing a profusion of singularly bright-colored purple and yellow flowers; a tender plant, liable to injury by the sun or severe rains. Sow the seed in a hot-bed; fine for green-house or out-door decoration.

Sweet Pea.—A fragrant annual, attaining five or six feet in height, with white, rose, scarlet, purple, black, and variegated flowers; each variety by itself in circles, about a foot in diameter, and three or four feet from any other plant.

Thunbergia.—A handsome green-house perennial climber, with numerous buff-colored flowers, with dark throat; succeeds well sown in open ground the last of May.

Trumpet Flower.—The scarlet variety is a magnificent climbing plant, producing large, trumpet-shaped, orange-scarlet flowers, of great beauty, from July to October. Propagate by layers, or root cuttings; should be laid down and well covered with mats or litter for Winter.

Verbena.—It is a naturally prostrate creeping plant, a half-hardy annual; flowering from seed sown in the open ground in May, with dazzling scarlet and other tinted colors. If started in pots, it will bloom all Summer.

Vinea, or Periwinkle.—Some of the varieties are hardy evergreen trailing plants, flowering early and late, generally of blue colors, and flourishing under the shade and drip of trees. A little Winter protection is best.

Virginia Creeper, or American Woodbine.—A beautiful and luxuriant hardy climber, easily propagated by layers and cuttings; often covering walls of houses forty or fifty feet high; flowers a reddish-green, succeeded by clusters of dark blue or nearly black berries. A rich, moist soil is most suitable.

Virgin's Bower, or Clematis.—A hardy, climbing, perennial shrub, free-flowering, rapid growth, very ornamental, and some varieties are highly odoriferous. Siebold's variety, producing flowers three or four inches in diameter, is magnificent. Propagate by layers; it needs to be laid down and covered for Winter.

Wall Flower.—A fine biennial, with its single, semi-double, and double flowers, varying from light yellow to orange, and reddish brown to violet. It needs the green-house, or a light, dry cellar for Winter.

Wistaria.—A very hardy, magnificent climbing shrubby plant, with its superb masses of

variously colored, richly perfumed, and delicate flowers in May. Raised from cuttings or layers. One of the very finest of climbing vines, and worthy of wide cultivation.

Hardy Flowering Shrubs and

Trees.—A selection of some of the best kinds is herewith given. In order to grow rapidly, shrubs should be kept well cultivated in mellow soil, which may be effected by placing them in large circular or elliptical beds cut in grass; and to prevent broken and confused outlines, shrubs of nearly the same size should be placed in proximity to each other; and those having some resemblance in general appearance or natural affinity, will group better together than those which are entirely dissimilar. The center of a large bed should be occupied by the taller shrubs, and those of the darkest and heaviest foliage; and if there are any which are planted for their showy or red berries, they will appear finest in Winter by placing them around the bed, with evergreens in the center or rear.

The half-hardy shrubs require, before the setting in of Winter, to be bent down, and covered three or four inches deep with stable litter.

African Tamarix.—An elegant and graceful shrub with delicate pink blossoms. Flowers in May. To be protected in Winter.

Althea.—Raised from seed or cuttings, single and double varieties; a warm and sheltered situation is best, particularly for the double white variety; and in a northern latitude require, during the Winter, to be kept in a box of dirt in the cellar.

Barberry.—Small yellow blossoms in Summer, and brilliant berries in the Fall.

Catalpa.—A beautiful tree, much admired for its foliage and showy flowers; it requires a warm and sheltered position.

Cherry, Double Flowering.—Full of double, pure white flowers, like small white roses, covering the tree the early part of May. By proper training, it can be kept in the shrubby state.

Corchorus, or Japan Globe Flower.—Very desirable, as it blossoms profusely from Spring to Autumn. Flowers are double, and of a bright yellow color. To be protected in Winter.

Deutzia.—An elegant shrub, sufficiently hardy to endure our Winter, producing a profusion of highly fragrant white blossoms. Propagated by cuttings or layers, and protect in Winter.

Flowering Almond.—A favorite, early flowering shrub, with large white and pink varieties of flowers, resembling small roses. Raised from offshoots or layers. Hardest when budded on the plum—probably the wild plum is best.

Flowering Currants.—There are several kinds of these beautiful and fragrant shrubs—the Red Flowering, the Crimson Flowering, the Golden Flavored, the Fragrant currant, and the Double Crimson currant. They need Winter protection.

Fringe Tree.—A deciduous shrub or small tree, beginning to flower when six or eight feet high; its flowers white, in long bunches, with a fringe-like appearance. It is hardy.

Honeysuckle.—An upright ornamental shrub, growing eight or ten feet high, with a profusion of pink flowers in June, succeeded by red berries; another variety produces white flowers and yellow berries. Propagated by seeds, layers, or cuttings.

Hydrangea.—A small shrub, bearing a large flower, first green, then gradually becoming rose-colored, and then green again. It requires to be kept in a green-house or light cellar in Winter.

Laburnum, or Golden Chain.—An elegant shrub or low tree; raised from the seed; requires a warm and sheltered situation; produces pendulous clusters of golden pea-shaped flowers.

Lavender.—A most desirable dwarf shrub, growing three feet high, delightfully fragrant, particularly its spikes of blue flowers in July. Propagated by cuttings or slips.

Lilac, or Syringa.—The common purple and white lilacs, grown together, are beautiful, and the Persian lilac, with its bunches of delicate flowers frequently a foot long, white and purple varieties are even more graceful in their appearance. Propagated by suckers.

Magnolia.—A remarkably handsome shrub, and when carefully trained, it forms a beautiful little tree. It produces a pure white flower, two or three inches broad, as beautiful, and almost as fragrant as the White Lily. Propagated by layers, which require two years to root sufficiently; the shrub should be partially shaded from the sun.

Oleander.—A noble evergreen shrub, of easy culture, and flowering freely during the greater part of the year; growing well in any rich, light soil, and young cuttings root easily if kept moist. It needs green-house or cellar protection in Winter.

Pink Mazereon.—A small and hardy, sweet-scented shrub, raised from the seed, whose flowers, in beautiful clusters, come out before the leaves in the Spring, followed by berries, one variety a brilliant scarlet, another yellow. When transplanted, it should be in Autumn.

Red Bud.—A curious shrub, or low tree, covered with bunches of rose-colored flowers before the leaves begin to appear. Often seen in Canada, the Northern and New England States.

Rose Acacia.—Produces a succession of large clusters of purple flowers. Hardy.

Rose.—Many persons, says the *Western Rural*, neglect the pruning of their rose-bushes until the leaves have begun to expand. This is a very erroneous practice, for much of the strength of the plant is expended in fruitless endeavors to revive a half-withered branch, or to restore such as have been shattered, yet allowed to hang on. Hardy roses should be severely pruned in order to secure a profusion of bloom of the best quality. Hybrid perpetuals should be cut nearly to the ground, and mosses down at least one-half.

The rose plant is a gross feeder, and requires abundance of manure to supply nourishment to its numerous branches, leaves, and flowers. Well-rotted cow manure is the best adapted to its wants. The soil which surrounds the stems should be removed in Spring before the leaves expand, in order that the pupæ and larvæ of injurious insects be exposed before their time and destroyed. The excavation made by removing the soil should be filled with rich muck or well-rotted cow-manure. By this means a double advantage will be gained.

The stems and branches should be washed with a solution of soda, a strong ley, or even soap-suds, in order to remove the pupæ or larvæ of insects, which may be in clefts or crevices of the bark. If this precaution was taken in proper time, we should not see so many fine roses destroyed by the rose-slug and other pests.

Bourbon and Bengal Roses, Monthly.—Flowering from June to October. These families contain some of our most valuable Autumn flowering roses, remarkable for their fine foliage, compact habit, brilliancy of color, and the profusion and long continuation of their flowering. They require protection during the Winter, or they may be taken up and placed in the cellar or cold frame until Spring. *Acidalie*, white, large, and fine; *Animated*, rosy blush; *Appoline*, cupped, carmine; *Belle Isidore*, crimson; *Bourbon Queen*, rich blush; *Bosanquet*, blush white; *Don*

Carlos, dark rose; *Douglas*, rich violet; *Dutchess Thuringe*, French white; *Gloire de France*, very fragrant crimson; *Gloire de Rosamene*, brilliant crimson; *Imperatrice Josephine*, creamy white; *Indica Alba*, pure white; *Madame Lacharme*, blush white; *Paul Joseph*, velvet, crimson; *Princess Clementine*, deep rosy purple; *Queen*, delicate blush; *Reine de Fontenay*, brilliant rose; *Sombreil*, French white; *Souvenir de la Malmaison*, creamy white, fine; *Theresita*, bright carmine; *Vanilla*, dark rose.

Climbing Roses.—Among the hardy climbing roses, the *Prairie* varieties are well known and very desirable for their remarkable vigor, their habit of retaining the freshness of their foliage all the season, and their wealth of beautiful flowers; they are well adapted for training to poles, planting in rows, and festooning from one to another, also for screens or trellises. *Queen of the Prairies* and *Baltimore Belle* are the best known; all the varieties are very showy. *Banksia Lutea*, double yellow; *Banksia Alba*, white; *Bengalensis Scandens*, large rosy white; *Boursault Elegans*, purple crimson; *Boursault Purpurea*, purple; *Boursault Blush*, large blush; *Boursault Gracalis*, bright rose; *Climbing Moss*, rosy crimson; *Cottage Cluster*, crimson, changing to rose; *Felicite Perpetuelle*, blush white; *Gem of the Prairies*, light crimson, white blotched; *Grevillia*, producing immense clusters of various colors and shades, from white to crimson; *Laura Davoust*, white; *Multiflora*, pink; *Multiflora Alba*, blush white; *Prairie Queen*, purple, veined white; *Prairie*, or *Baltimore Belle*, blush white; *Prairie Superba*, rich blush, *Russelliana*, crimson cottage rose; *Scarlet Greville*, crimson scarlet; *Seven Sisters*, crimson, changing from all shades to white.

Noisette, or Cluster-Flowering Monthly Roses.—A very beautiful climbing variety, flowering in large clusters the whole Summer and Autumn; the flowers large and fragrant. They must be kept in the house or cellar during the Winter. *Alba*, creamy white; *Aimee Vibert*, pure white; *America*, straw color, shaded purple; *Bengal Lee*, blush fragrant; *Celestina Forrester*, orange yellow; *Conque de Venus*, white rose; *Cœur Jaune*, white, yellow center; *Chromotelle*, large yellow, fine; *Fellenberg*, crimson, superb; *Gloire de Dijon*, blush, white, buff center; *Joan of Arc*, pure white, straw center; *Lamarque*, creamy white, fine; *Madame Longchamps*, large, pure white; *Marshal Niel*, large, deep canary yellow; *Ophire*, yellow, fragrant; *Oteri*, orange, salmon-shaded; *Solfatare*, superb, dark

yellow; Washington, white, immense clusters; Vitellina, white.

Hardy Garden Roses.—Austrian Brier or Harrisonii, deep yellow; Coronation, purple crimson; Du Roi, perpetual, bright red; Hybride Blanche, white; Moss, single, crimson, very mossy; Moss, Common, rose; Moss, Luxembourg, crimson; Moss White, perpetual; Painted Damask, white; Persian, double yellow; Village Maid or La Belle Villageoise, rose, striped with lilac; York and Lancaster, red and white.

Hybrid Perpetual Roses.—To this class belong some of our most beautiful and splendid varieties, keeping up a succession of their elegantly formed and highly fragrant flowers, through the whole of the Summer and Autumn. Many of the varieties are suitable for planting against pillars or walls where they flower freely. They thrive best in a rich soil. Auberon, clear red, very fine; Arthur de Sansal, double, deep crimson, purple; Black Prince, crimson maroon; Cardinal Patrizzi, brilliant crimson; Countess de Cheabrilland, beautiful rose pink; Countess d'Orleans, double, delicate pale rose; Dutchess of Norfolk, double, deep rich crimson; Emperor Napoleon, intense brilliant, shaded scarlet; General Castellane, large, double brilliant crimson; Jules Margottin, bright deep crimson; Lady Alice Peel, rosy carmine; La Reine, satin rose, superb; Lord Raglan, double-cupped, brilliant crimson scarlet; Madame Desire Giraud, pale flesh, crimson striped; Madame de Willermots, cup-shaped, extra fine; Madame Laffay, light crimson, very fragrant, superior; Madame Masson, double, deep purplish crimson; Madame Plantier, pure white; Madame Vidot, delicate, wax pink; Naomi, delicate blush, double flowers; Odeur Vitale, delicate Rose, silvery shading; Ornement des Jardins, double, vivid crimson; Pæonia, double, reddish crimson, extra fine; Prince Albert, very dark crimson, fine; Pius IX, crimson violet; Queen Victoria, pale flesh, pink tinted; Reine des Violettes, dark violet; Sir John Franklin, double, brilliant crimson; Souvenir de Count Cavour, rich glossy crimson.

Tea Roses, Monthly.—Perpetual; general favorites with all lovers of the rose. To those who cultivate roses in pots they are indispensable; celebrated for their peculiar fragrance. Rather more delicate than the Bourbon or China, and require more protection through the Winter. Alba, pure white; Apollo, carmine red; Archduchess Theresa, white; Camellia, pure white; Cels, blush, profuse bloomer.

Charles Reyband, rosy salmon; Comtesse Almarle, straw color; Cortas, blush, mottled pink; Devoniensis, creamy yellow; Fleur de Cymes, globular white; Flon, buff; Isabella, Sprunt or Yellow Tea, canary yellow; Madame Falcot, orange yellow; Madame Maurin, pure white; Nina, large, pinkish violet; Pactole, canary yellow; Safrano, orange yellow; Sortte, French White; White Tea, white.

Grafting Roses.—It should be remembered that all the hardy perpetual roses, which are somewhat difficult to propagate by cuttings, can be easily and rapidly increased by grafting on small pieces of roots. At any time when the ground is open, dig up the roots of the Manetti, or of the old Boursault roses; cut them in pieces of, say, four inches long. For grafts, use well-ripened shoots of the past year's growth, cutting them into pieces, each having three to four buds; cut the lower end into a wedge or V form; then having cut a piece of root, square across the top end, split it, and while with the knife in the split holding it open, insert the wedge-shaped graft, fitting as perfectly as you can on one side, bark to bark; then withdraw the knife, and with narrow strips of cotton or linen cloth, dipped in melted grafting wax, wrap carefully all over and around graft and root, in such a manner that the graft can not be displaced, nor moisture get within or next to the wound or cut; pack away in moist, not wet, sand, covering all the graft and root. In Spring, when the ground is in good working condition, set out the graft leaving the upper bud just level with the ground, and further care is needed only to keep the ground from baking on top, or to keep the weeds down.

Snow Ball.—Blooming very early and profusely in Spring; flowers like snow balls.

Snow Berry.—Small pink flowers, but it is chiefly prized on account of its beautiful clusters of white wax-like berries, which hang upon the shrub long into Winter.

Spiræa.—There are many varieties very handsome, and flowering through Summer. Plant the Siberian or White and the Red Flowering.

Strawberry Tree.—A handsome shrub, bearing in Autumn, an abundance of fruit, somewhat resembling the strawberry. The European is preferred to the American. Grown by seed and by suckers.

Syringa, or Mock Orange.—White flowers, very fragrant in early Spring.

Tree Peony.—A small but showy shrub, blossoms very large with varying purple shades. Protect it in Winter.

Weigelia Rosea.—One of the handsomest and must showy shrubs that we have. A profuse bearer of rose-colored flowers in early Summer.

Evergreens and Shade Trees.—

In selecting forest trees for transplanting, it is desirable to get those with short trunks and low spreading branches, or what are generally called round-topped trees, which can only be found on the outskirts of the woods, or in second growth timber. A gentleman of Wisconsin, of large experience in transplanting shade trees, submits these practical suggestions on the subject: In the month of June, after the first and most plentiful supply of sap has gone upward, and the foliage is well put on, I select my trees—hard maple preferred—not of less size than four inches through near the ground, straight and smooth, no matter how tall, and then saw off the body of the tree about ten feet from the ground. Then I cut off a few of the largest lateral roots that lie near the surface, with an ax by a slanting blow so as not to bruise or otherwise disturb the root, about two feet from the trunk, and then I go quietly away to another, leaving the tree in its natural bed until the next November or the next Spring, if Fall transplanting is not approved of, when the tree will be found to have sent out new branches, some two feet long in the few months it has been allowed to remain, and a new and desirable top already begun, as nature is ever active in repairing damages when it has the power to do so, as the tree has whose roots are undisturbed. Then I take it up carefully with as much earth and as many of the small roots as practicable, which may be done the more easily by having previously prepared it as stated above. Then I make a good bed a little larger than the roots, so as not to cramp them; fill in closely around the roots well mixed and light earth, mulch it with some sort of litter, such as leaves, sawdust, rotted chips, or almost anything to prevent too rapid evaporation of the moisture, and stake well, but not too stiffly, as I would have the tree learn to sustain itself as quickly as possible by throwing down new roots, which it will do more readily than if wholly supported—then I have done my duty, and the tree is planted.

Under this plan I can set out such trees as I like, form and fashion the tops to my liking, and can set trees six inches through, saving several years in their growth, and what is best, I will not lose one in fifty. It is no wonder that so many fail and get disgusted in tree planting when so many are lost, and when it

takes so long to realize the benefit or beauty of the tree, as in the usual practice of setting out mere whip sticks, losing at least half, and waiting half a life-time for them to amount to anything desirable for shade. I prefer in this climate to set out trees in the Fall. I know that large ones are much more likely to live, and I know the above plan has proved successful with me.

Deep trenching, twenty inches to two feet, has an important influence on the transplanted tree, both as respects its living and its growth and thrift. Below the ordinary surface soil there is a pan or hard crust, impervious to roots or moisture from either above or below; in dry weather, particularly, this hard pan becomes still more compact, so much so that a few weeks of severe drought will frequently prove fatal to trees. By deep trenching, this difficulty is obviated, and the ground fitted for the reception and permanent prosperity of the tree. The top soil should be transferred to the bottom, if the subsoil is not naturally in good condition.

Arbor Vitæ.—The American *Arbor Vitæ* is of slow growth, attaining a height of fifty feet, forming a handsome pyramidal evergreen, and thriving in almost any situation. It is hardy, bears clipping, and is well suited for wind screens and ornamental hedges. The Chinese variety has proved hardy, having a more lively green foliage than the other.

Balm of Gilead is a beautiful deciduous shade tree, of rapid growth, emitting from its young leaves a resinous matter of great fragrance. Propagated from slips.

Balsam Flr.—A hardy, symmetrical evergreen, of persistent color, and handsome in its youth.

Box Tree.—A fine ornamental evergreen, with silver or golden striped varieties, much larger than the garden box. May be trimmed to any desired shape. Increased by layers.

Cedar of Lebanon.—A fine evergreen, but of slow growth; worthy of cultivation from its sacred associations. Its seeds are borne in fine large cones.

Dogwood, the common variety and the Red Osier; both pretty, and easily obtained from the woods—the red for the beauty of its crimson-colored wood in Winter.

Black Walnut.—A fine tree, of rapid growth, wide-spreading top, and at eight or ten years of age begins to bear walnuts. It is valuable for timber. It is difficult to transplant black walnuts; but easy to raise them from the nuts,

by planting them soon after they fall from the trees.

Butternut.—Pretty much the same may be said of this as of the Black Walnut, producing a richer nut, and both are perpetual bearers; and it may be added that Shell-bark Hickories may be raised in the same way, bearing when about sixteen years old. The Chestnut is more thrifty, and bears younger, but requires a warm loamy or sandy locality.

Elm.—One of the noblest of American shade trees, especially for bordering walks and roadsides. Greatly distinguished for its grace and beauty. It grows slowly, but as a shade tree is unsurpassed.

Golden Chain.—A small tree, of pretty foliage, of rather a weeping habit, bearing large hanging bunches of golden yellow flowers.

Hawthorn, Double Scarlet, a very delicate and pretty scarlet-flowering thorn; increased by grafting on the common hawthorn.

Hemlock, or Hemlock Spruce Fir.—One of the most beautiful of American evergreens, in the lawn or pleasure-ground, whether as a single pyramid of darkest green, or as a group. Very hardy.

Holly.—Both the European and American varieties form beautiful trees for ornamenting grounds, as single specimens or in evergreen hedges, with its bright green leaves and its attractive scarlet berries in Winter.

Horse Chestnut.—A very fine ornamental tree, of beautiful symmetry, blooming freely. The celebrated Buckeye variety of Ohio and Kentucky is a rather smaller and more compact growing kind,

Kalmia, or Laurel.—The beautiful wild laurel of our woods should be transferred to our lawns; its unfading greenness and its blossom-tuft formed of union of the countless star-like flower-buds, render it a tree of peculiar beauty and interest.

Larch.—This European tree makes a fine shade, is a very rapid grower, and is valuable for the durability of its timber.

Linden, or Basswood.—A beautiful but neglected shade tree, growing rapidly, producing large leaves, and a profusion of blossoms very grateful to bees.

Locust.—A common tree, of rapid growth, thin leaves, and fragrant blossoms.

Mahonia, a showy, holly-leaved shrub, of three or four feet high, especially gay in its Autumnal appearance.

Maple.—A popular shade tree, of slow growth, late in putting out its leaves, but very

graceful in its trunk and dense and symmetrical top of green; its Autumn foliage deep orange and red.

Mountain Ash.—A hardy, graceful tree for the yard and lawn, bearing numerous white blossoms, from which large bunches of brilliant orange-scarlet berries are produced in Autumn.

Norway Maple.—One of the finest of all deciduous shade trees; round-headed, with deep green foliage, changing by frost into variegated hues, and far superior to the popular Silver maple.

Myrtle, an evergreen shrub, cultivated with success in the Southern States, but too tender for the Northern and Middle States.

Paulownia.—A fine, rapid growing shade tree, with heart-shaped leaves sometimes measuring two feet across; producing, when not winter-killed, a fine light blue, and very fragrant flower. Increased by offshoots, layers, and root cuttings.

Peppertidge. A common tree, ornamental in its Summer growth, and when the frost gives its leaves a vermillion tinge in the Fall.

Pine.—The Austrian pine being perfectly hardy, is a great acquisition to our climate; and the Scotch pine is hardy and beautiful. There are several varieties of our native pines, generally lofty and pyramidal, producing needle-like leaves; the White pine being universally hardy, and one of the most beautiful trees for ornamental planting. The Hemlock Spruce Fir has already been noticed. The European Silver Fir is much handsomer than our native species, tender when young, but hardy when well established.

Pride of India.—A splendid flowering shade tree of the South, with clusters of fragrant lilac flowers. Unsuitable to Northern latitudes.

Red Cedar.—One of the Juniper varieties, one of our most valuable evergreen trees, growing from forty to fifty feet high, and valuable for purposes of shelter. In pruning the lowest branches should always be left the longest.

Rhododendron.—A wild swamp shrub, usually evergreen, characterized, by the great beauty of its flowers; requiring a sandy, peaty soil, and some shade and moisture. The Rose Bay is one of this family. Increased by layers or seeds.

Sassafras.—A sweet and aromatic tree, increased by offshoots, layers, or root cuttings.

Shadberry, or Canadian Amelanchier.—This is a thrifty, tall, upright tree, quite ornamental; sometimes, in favorable situations, attaining a height of thirty or forty feet, with a diameter

of ten or twelve inches. While it grows in the maritime parts of the Southern States, it is more particularly spread over the Northern portions of our continent up to Hudson's Bay, and from New Foundland to Oregon. It does well in the Northwest, blooming earlier than other trees, bearing clusters of sweet, delicious fruit, ripening early in June. The birds love it as they do berries or cherries.

Spruce.—Among the noblest of the evergreen trees. The beauty of the Hemlock spruce has been mentioned; the Black, Red, and American White spruce are fine pyramidal evergreens, but less attractive and desirable than the Norway spruce, which has succeeded admirably in this country.

Tulip Poplar.—Sometimes called White and Yellow poplar, and Whitewood tree, one of the handsomest of trees when covered with green and orange blossoms. The Aspen is a fine variety. The Lombardy poplar, well known, is less esteemed, except, perhaps, for protective belts.

Weeping Ash.—A curious and pretty tree, readily increased by side grafting upon the common varieties.

Weeping Cypress.—Has a large, expanded head, with pendulous branchlets, closely covered with leaves. Beautiful and hardy.

Weeping Willows.—There are several varieties, and quite ornamental, the Weeping willow, the Golden Twigged, and the Golden Flowering willow. Increased by cuttings or layers.

Yew.—The English and Irish yews are small bushes or trees of great beauty, on account of their dark green foliage, and their bright scarlet berries. The Canada yew, or trailing shrub, possesses no desirable qualities.

The Lawn.—In town but little space can be appropriated to the lawn, but in the country at least from half an acre to an acre, or even more, should be set apart for the decoration of the homestead. Nothing can give greater satisfaction to a family of refined taste than to have their home surroundings decorated with the beauties and green glories which Nature so bountifully supplies us. The species and varieties of trees, shrubs, roses, and vines, are now so numerous, that a choice selection can be made to suit every clime, soil, and exposure, and to bloom and fruit all the growing season. See them tastefully arranged and gorgeously dressed with foliage of various colors, and decked with blooms far transcending the most

costly jewelry in brilliancy, and perfuming the air with their fragrance. In windy days they gracefully bow, prance, and whirl around like sprightly youth in the dance, and the melody of the breeze serves them for music. How beautiful the picture and how great the enjoyment to those who can appreciate it. It makes a cot a palace, and home a paradise; the owner a king, and his wife a queen; it imparts a dignity to the manly graces of sons, and luster to the beauties and virtues of daughters. The passing wayfarer is delighted with the scene, and sets it down in his mind as the abode of the great and good in heart, and the virtuous and wise in actions.

After planting climbing vines to clothe the veranda, and a few deciduous trees around the house for shade in Summer, all the other trees, shrubs, and roses, should be so arranged over the lawn that all will be seen at one view. Set the more dwarf nearest the house, the taller farther off, and they will appear to rise in graceful folds as they recede from the eye, and the contrast of size, form, and color of the various individuals will show to greater advantage, and that will give additional graces to their charm.

Evergreens form a prominent attraction scattered through the lawn. Nothing makes a more beautiful contrast, in Summer or Winter, with the rest of surrounding nature. The somber and dark-colored evergreens, standing erect and pyramidal, present a rich and pleasing picture in Winter's landscape. Some of the dwarf varieties are pretty and attractive.

Good lawns have more to do with the cultivation and enjoyment of substantial home happiness than many are apt to suppose. God's sweet songsters love to linger there, and pour out their choicest notes and symphonies. The multiplication of shade trees often proves a barrier to malarious atmosphere and malignant diseases, thus preserving health and prolonging human existence.

Lawn Designs.—We take the following lawn designs chiefly from KERN'S Practical Landscape Gardening,* a work of much merit. They will afford a general idea of the lawn and its surroundings, subject, of course, to such modifications as the nature and the extent of the grounds may suggest.

In Figure 1, we have a city or town lot, with the dwelling situated in the center; in front, a lawn—which some might prefer to lessen one-

* Published by MOORE, WILSTACH & MOORE, Cincinnati.

half, and add it to the garden and fruit plat—employing the rear of the lot for garden, fruit, stable, and back-buildings. Both the kitchen and stable are concealed from view by groups of shrubby plants before them. A group of evergreens at the front right-hand corner of the building will appear to good advantage. The lawn is represented by A, the garden by B, and stable by C. The carriage drive from the front gate to the stable is represented on the design.

Figure 1.

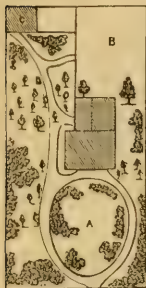
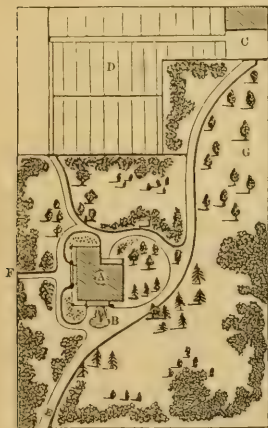


Figure 2.



A, House; B, Fountain, or Parterre of Flowers; C, Stable-yard; D, Kitchen-garden; E Carriage-entrance; F, Foot-entrance; G, Orchard.

Figure 2 gives the design for the grounds of a farm, or suburban residence, where half an acre or more is devoted to ornamental planting. The house is situated between groups of flowers and shrubbery. The out-house is situated in a copse of shrubs in the rear of the residence. Shade trees, flowering shrubs, and flower plats may be grouped and distributed so as to produce the most pleasing effect. Fruit trees may be planted in the lawn, generally bordering the walks, as they should also in the garden, inter-

fering less with the crops, while their roots largely fill the land beneath the walk.

Figure 3.



A, House; B, Grove of Forest Trees; C, Front-entrance; D, Back-entrance; E, Stable; F, Front Lawn.

In Figure 3, we have another design for the location of a country or suburban residence, with the lawn and other surroundings. In this arrangement, a goodly number of evergreens find a place in the lawn, as well as to the left of the main carriage-way. The view across the lawn should be left nearly unobstructed toward the most distant points, by planting small shrubs.

Arrangement of Trees and Shrubs.—In a valuable article on Rural Improvements, in the *Register of Rural Affairs*, by ROBERT MORRIS COPELAND, it is correctly suggested that there is a mistaken tendency to overplant small places with trees, making too dense a shade, and preventing a proper proportion of other improvements. No paths, lawn, flower beds, or other decorations, will make up for badly selected or badly grouped trees and shrubs. As there is a great variety of flowering shrubs, and as they blossom at different seasons, more beautiful groups may be made with them than with larger trees. In large places, shrubs and low trees should fringe the plantations, and fill the curves and bends of paths, and be used to bring out points or continue outlines, much as a lady develops her patterns in worsted work by a filling of some uniform color.

Trees and shrubs, Mr. COPELAND also suggests, are too often planted in rows and formal lines. Nature abhors stiffness and regularity; every group or woodland edge which we admire, will be found upon examination to be made up of mixed trees and shrubs which grow at various distances from each other. There will often be in a space of ten feet square, twenty varieties of shrubs, or half a dozen trees, and in the next ten feet, only one or two. By this irregularity the best natural effects are produced, and while we can never hope to imitate Nature perfectly, we may approach her if we will follow her methods. A proper plan of arrangement should be carefully studied, and both evergreens and deciduous trees should be grouped with reference to their different shades of color, so as to give the greatest effect of light and shade to the landscape.

Treatment of Trees and Shrubs.—No trees, evergreens especially, should be suffered to have grass grow about them for a year or so after planting. It becomes "rank" in the deeply loosened soil, abstracts moisture, and otherwise seriously interferes with the tree. When the tree gets a fair start, grass does less injury, and when it becomes a tough sod, and the tree by its shade, or say by frequent mowing, keeps the grass short, the grass roots do not penetrate deep, and the sod is a benefit by keeping the surface spongy, and the substratum cool. They need mulching for a year or two, the evergreens more than deciduous—the roots of the former, in periods of drought, absorb all the moisture within their reach, and die, while the deciduous trees will perhaps only shed their leaves, and recover with a return of moisture.

Taste will dictate the proper pruning of shade trees and shrubs. June and August are the suitable seasons for pruning evergreens into such forms and shapes as may be desired—their natural pyramid form being generally preferred as one of rare beauty.

Seeding Lawns and Grass Plats.—When the soil has been properly prepared and the surface made sufficiently smooth with the harrow and roller, grass-seeds of suitable varieties will do very well. A good, permanent green sward can not be obtained in soil that is saturated with water at one season and parched with drought at another. When a soil is full of stagnant water the roots of grass can not penetrate into it in search of nutriment. When the

water is evaporated by the heat of the sun in Summer, the soil bakes into hard clods, into which the roots can not penetrate, and consequently the plants become dry and withered. A good close sward of evergreen grass can not be obtained except the soil is drained naturally or artificially, tilled deeply and laid down with suitable varieties of grass. When a lawn or grass plat has but a thin surface soil the roots of the grass can not draw up moisture by capillary attraction, and the plants turn brown in Summer. Manuring on the surface induces a rapid growth of grass, but not having much roots it soon withers. The better plan is to till deeply, and incorporate the manure with the soil, so that the roots may reach it gradually.

Red top and white clover make a good mixture for lawns; three bushels of red top to ten pounds of white clover, or four bushels of red top alone, is none too much for an acre, and it should be rolled with a heavy roller. The only objection to white clover is that it grows too fast and requires cutting too often. Blue grass makes a closer turf than red top, but it fades sooner. Sweet-scented vernal grass vegetates very early in Spring, and makes a close sward. It is desirable on account of its agreeable perfume when cut and exposed to the sun. The surface of a lawn or grass plat ought to be perfectly smooth, and the grass should be kept closely shaved. When the grass becomes thin and of weakly growth, a top-dressing of good, well-rotted stable manure should be spread over the surface in December.

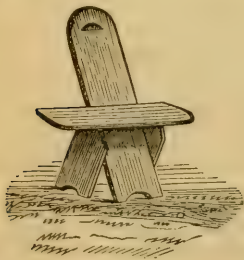
Lawn Decorations.—A green expanse of lawn, if well kept, is in itself a beautiful object; but its beauties are twice multiplied by dropping upon it, here and there, at wide distances, such picturesque features as shall serve to emphasize and give character to special inequalities of surface. Now, it may be an old tree lifting its bare arms, and carrying the feathery tendrils of some graceful climbing plant; again, it may be a dense coppice of evergreens; and again, a shimmer of water, with possibly some piquant bit of architecture upon its border that shall serve as a home for aquatic fowl.

Rustic furniture, properly distributed, give a pleasing effect to the lawn. The accompanying cut represents a picturesque ornament. It is simply a section of a stump from the woods, sawed off near the roots, dragged home, and set upon the grass. When made a pedestal for

cut or growing flowers, and partially concealed in vines, it constitutes a very cheap and rustic addition to the home surroundings.



The accompanying design for a garden chair, of very simple construction, may be usefully imitated, where cheapness and utility are the main ideas:



Figures 1 and 2 represent rustic chairs; Fig.

3, a rustic table, formed of the trunk of a tree, with well-selected branches, inverted, with an appropriate circular top; Fig. 4 represents a rustic stool; and Fig. 5, a rustic foot-bridge, which should be strong and durable, the joints secured by iron bolts, and the ends resting on stone abutments.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.

FRUIT AND FRUIT TREES:

THE ORCHARD, VINEYARD AND SMALL FRUITS; VARIETIES, VALUE, AND PROPAGATION.

The Origin of Fruits.—The apple, quince, and grape are natives of many countries, and it is not known that they ever belonged exclusively to any one. Some of the finest and most delicious of all our fruits, however, originated in Persia, Armenia, and other parts of Asia, whence they have been transplanted, naturalized, and improved by culture, under the auspices of civilization. The quince is traced to Persia, and to the Island of Candia.

The apple, *malus* in botany, is unquestionably a native of the Eastern parts of the world, as we learn, on the authority of the earliest writers, both from sacred history and from the information given by the ancient Romans. The prophet JOEL, when he declares the destruction of the earth by a long drought, mentions the fruits held in estimation, and among them he names the apple tree. PLINY, in his Natural History, which was written about the commencement of the Christian era, says one named SEXTUS PAPINIUS brought two kinds to Rome in the reign of AUGUSTUS CÆSAR—one from Syria, the other from Africa.

The crab, or the apple in its wild state, is a native of most countries of Europe, but whence we received the cultivated apple is unknown; in all probability from the Romans. It was largely planted in England by monks, all of whom seem to have been their own gardeners, and to have taken great delight in the cultivation of fruit; and the remains of their old abbey gardens show that they chose the best spots as to soil and aspect. As early as 674 we have a record describing a pleasant and fruit-bearing field at Ely. Ely, in England, at the present day has some splendid orchards, and the cultivation of fruit there is very much encouraged.

The cultivated apple seems to have been scarce at Rome in the time of PLINY, for he states that there were some apple trees in the villages near Rome which yielded more profit than a small farm; and he mentions twenty-

nine kinds of apples cultivated in Italy. The trees at this early time seem to have required the fostering care of man. Of all the fruit-bearing trees in Italy, PLINY says the apple is the tenderest and least able to bear heat or cold—particularly the early one that produces the sweet jenneting. Over fourteen hundred varieties of apples have been enumerated in a single catalogue.

The apricot is a fruit of the plum tribe, which grows wild in several parts of Armenia, and was introduced into England about the middle of the sixteenth century. It is of olden origin, having been mentioned by COLUMELLA, PLINY, and DIOSCORIDES, it grows in Japan and China, and the whole range of the Caucasus. Cherries are a fruit of the prune or plum tribe, the original stock of which is the wild cherry. They are said to come from Cerasus, a city of Pontus; whence LUCULLUS brought them after the Mithridatic War. They spread wherever the Romans extended their arms, and were introduced into England in the first century.

The peach is a native of Persia, whence it spread over Europe, into England, about 1562, and subsequently into America. The nectarine, also, is a native of Persia, introduced into England in the sixteenth century; LINNÆUS places both in the same genus with the almond, and many botanists regard the almond as the parent of both the others.

The culture of the pear is very ancient, and several varieties were known to the Greeks and Romans. The plum, although found wild in England and America, is supposed to have originated in Asia; DIOSCORIDES, a Greek physician and author, who wrote in the first century, mentions it. One variety, the Damascene, took its name from Damascus, the Syrian city. The mulberry is a native of Persia, whence it was introduced into Europe about the sixteenth century.

Blackberries were highly esteemed by the ancients, and the elder PLINY, who flourished in the first century, spoke of their medicinal virtues. Currants and raspberries have long been cultivated in Europe, and wild varieties of both are found in the northern portions of America. Gooseberries, natives of Siberia and the north of Europe, as well as America, have been improved by the Dutch and English gardeners. Persia is generally considered the native country of the grape, where it is still cultivated with great success. It is supposed to have been introduced into England at the commencement of the Christian era. The strawberry, though known to some of the early Roman writers, is not enumerated among their cultivated fruits or vegetables. VIRGIL mentions it only when warning the shepherds against concealed adders when seeking flowers and strawberries; OVID mentions the Alpine and wood strawberries, and PLINY speaks of it as one of the native plants of Italy. It has been cultivated only about four centuries.

The Utility and Healthfulness of Fruit.

—The apathy of people generally to the cultivation of fruit is surprising. Nine-tenths of the intelligent, industrious, pains-taking, and economical people, who will busy themselves twelve or fifteen hours a day in their ordinary pursuits, entirely neglect providing themselves and their families with this luxury, though they may have ample grounds for the purpose, every way fitted for producing it in profusion. We call it a luxury, but it is more properly one of the necessities of life; and for the want of it, persons frequently become diseased, or continue so, if disease is induced from other causes, when the free use of seasonable, well-ripened fruit would restore them at one-fiftieth part the expense incurred by apothecaries' and doctors' bills. We seldom hear of an ailing family, whether adults or children, that indulges freely in wholesome fruits, and abstains from the made-up dishes of the pastry and other cooks.

But it is not as a corrective or medicine only, that we deem fruit invaluable as an article of diet. It has a direct money value, estimable in dollars and cents, for the amount it contributes as food to the support of the human system. This is conclusively proved, both theoretically and practically; for accurate analysis has shown that cultivated fruits contain large proportions of nutritive matter, and experience

equally proves that when fruit enters largely into the diet of the family, a corresponding diminution of other food is always apparent.

The late DAVID THOMAS, so distinguished as a fruit culturist, often made the remark, that among all his acquaintances he scarcely knew a person who was decidedly fond of good fruit who became a hard drinker. He considered the two tastes as distinct and antagonistic. There is undoubtedly much truth in this remark. There appears to be a natural demand in the system for fruit, and this demand not being always met, many are tempted to fill the vacancy, by drinking alcoholic liquors. One of the best things we can do, therefore, while we urge the positive importance of temperance principles, and the prevention of a perverted appetite, is to endeavor, by the increased culture of fruit in all its kinds, so to extend the circle of supply throughout the year, as to assist this benevolent exertion by lessening or taking away the temptation to supply its deficiency with intoxicating drinks.

A writer on growing fruit and its healthfulness as a proportion of our food, says: "Never shall I forget the impression made upon my mind at a very early period of my life, by the directions given my mother by the family physician, as she sat weeping over the cradle in which I had lain for a number of days in a hopeless condition. 'Now,' said he, 'don't you give that boy one drop of cold water, and you had better keep these strawberries out of his sight.' In a few hours my brothers and sisters returned from the meadow with a pail overflowing with the delicious fruit, and supposing me too far gone to observe anything in the room, the berries were left near my cradle. I soon opened my eyes upon the tempting delicacy, and in a few unobserved moments filled my parched mouth several times with the cooling beverage, for they were really like water on my dry and parched tongue. In a few hours I broke out in a fine perspiration. My tongue, which had been rattling on my teeth, became moist, and when the doctor came he said my fever had turned—the calomel has produced its desired effect, and I should probably get well."

"The use of ripe fruits," says Dr. J. A. KENNICOTT, "not only prevents disease, but their regulated enjoyment helps to remove that which already exists. Good fruit is always grateful, even to the sickly or palled appetite, and in the young and healthy its promising appearance or its delicious aroma often excites the most ungovernable appetite, and they

gorge themselves, and suffer therefrom no worse than from a surfeit of fish, flesh, or vegetables, perhaps, but still enough to aid in perpetuating the vulgar idea that the unrestricted use of fruit is dangerous. Who ever heard of children or men who provide seasonable fruits in abundance, and permit their habitual use, eating too much, or becoming sick therefrom? I never did. I have had a little experience in this matter, and have taken pains to collect information, and know that the families where fruit is most plentiful, and good, and most highly prized as an article of daily food, are most free from disease of all kinds, and more especially from *fevers and bowel complaints.*"

All ripe fruits are, also, more or less nutritious. Professor SALISBURY has clearly demonstrated that the apple is superior to the potato, in the principles that go to increase the muscle and the brain of man, and in fattening properties it is nearly equal, when cooked, for swine, or fed raw to other domestic animals.

As an article of food, the value of the apple in this country is underrated. Besides containing a large amount of sugar, mucilage, and other nutritive matter, apples contain vegetable acids, aromatic qualities, etc., which act powerfully in the capacity of refrigerants, tonics, antiseptics; and when freely used at the season of mellow ripeness, they prevent debility, and indigestion, and avert, without doubt, many of the "ills which flesh is heir to." The operatives of Cornwall, England, consider ripe apples nearly as nourishing as bread, and far more so than potatoes. In the year 1801—which was a year of much scarcity—apples, instead of being converted into cider, were sold to the poor; and the laborers asserted that they could "stand their work" on baked apples, without meat; whereas, a potato diet required either meat or some other substantial nutriment. The French and Germans use apples extensively, as do the inhabitants of all European nations. The laborers depend upon them as an article of food, and frequently make a dinner of sliced apples and bread. There is no fruit cooked in so many different ways in our country as apples; nor is there any fruit whose value, as an article of nutriment is as great, and so little appreciated.

There is scarcely an article of vegetable food more widely useful and more universally liked. Why every farmer in the nation has not an apple orchard, where the trees will grow at all, is one of the mysteries. Let every housekeeper lay in a good supply of apples, and it will be

the most economical investment in the whole range of culinarics. A raw, mellow apple is digested in an hour and a half, while boiled cabbage requires five hours. The most wholesome dessert that can be placed on a table is a baked apple. If eaten frequently at breakfast, with coarse bread and butter, without meat or flesh of any kind, it has an admirable effect on the general system, often removing constipation, correcting acidities, and cooling off febrile conditions more effectually than the most approved medicines. If families could be induced to substitute apples—sound and ripe—for pies, cakes, and sweetmeats, with which their children are too frequently stuffed, there would be a diminution in the sum total of doctors' bills, in a single year, sufficient to lay in a stock of this delicious fruit for the whole season's use.

Value of our Fruit Product.—By the census of 1850, the total value of the orchard products of our country was, in round numbers, \$7,723,000, while the census returns of 1860 exhibited an increase to twenty million—nearly tripling the value in ten years. These returns did not include small fruits, nor the wine product. The latter, in 1860, was over one million, six hundred thousand gallons, the value of which could not have been less than three or four millions of dollars. The returns of the orchard product of Massachusetts for 1865, exhibited nearly double the valuation of 1860, while the Western and Pacific States must have increased in a much larger ratio; so that the annual value of the orchard product of our country can not now be much, if any, less than fifty millions of dollars; and we may safely add another ten million for small fruits, and twice as much for wine.

California alone, in 1866, produced over three million gallons of wine, and fifty thousand gallons of brandy—the estimated value of which was \$10,000,000; and in 1868, the grape product of that State was one hundred and twelve million pounds, one-half of which was manufactured into wine. This, at eleven and a half pounds to the gallon, would show nearly five millions of gallons for that year.

Profits of Fruit Growing.—Looking carefully into the matter of the profit realized from all descriptions of fruit growing, and running over a few authorities on the subject, multitudes of instances are to be found where extraordinary gains are annually realized without unusual care or skill.

A gentleman within our knowledge, says the *American Agriculturist*, has a small orchard of less than seven acres, on the Hudson River, which produces from \$500 to \$750 worth of apples annually—this is the average annual yield, one year with another; and all this is secured by the simplest process—management. RICHARD I. HAND, of Mendon, New York, sold in one year, four hundred and forty dollars worth of Roxbury Russet or Northern Spy apples, the product of a single acre. HILL PENNELL, of Darby, Pennsylvania, sold, in one year, two hundred and twenty-five dollars worth of early apples, from half an acre. HUGH HATCH, of Camden, New Jersey, obtained from four trees of the Tewksbury Blush variety, one hundred and forty bushels of apples, or thirty-five bushels from each tree; of these he sold the following Spring ninety baskets, of about three pecks each, for one dollar per basket.

If one tree of the Rhode Island Greening will yield forty bushels of fruit, which has often been realized, and these should be sold at only twenty-five cents per bushel, forty such trees on an acre would yield a crop worth four hundred dollars; but reducing this yield to one-quarter as a low average for all seasons, and for imperfect cultivation, the result would still be equal to the interest on fifteen hundred dollars.

E. H. SKINNER, of McHenry county, Illinois, a widely-known and successful fruit cultivator in the West, wrote to the *Country Gentleman*: "My young apple orchard of five acres, set three years ago this November, was a sight this Fall to look at. We gathered one hundred and three bushels of the Wagner apple, and fourteen and a half barrels of the Ben Davis apple from it, and they sold at five dollars per barrel as soon as gathered. This should be enough to convince sensible people that it *pays to subsoil and prepare land thoroughly for an orchard*. This orchard of five acres has already paid for itself, and I would to-day refuse fifteen hundred dollars for it. Have just sold ten acres of six year old orchard for two hundred dollars per acre. This we call a good orchard, though it can never equal the above mentioned, simply for want of first preparing the land. What I once called good preparation I now call slipshod.

"The facts are simply these—to have an extra orchard, we must go to the bottom, and make the whole field as mellow as a garden-bed, *not less than twenty inches deep*. We were at this kind of work when it froze up, with four men, four teams, and two plows, and could not fit up more

than half an acre per day. On one acre and nineteen rods of land I raised one hundred and sixty-two and a half barrels, getting an extra price for them—netting over one thousand dollars. *Whose corn field pays better?* Nearly one-third sold at eight dollars per barrel, and most of the remainder at seven dollars per barrel."

In THOMAS' Fruit Culturist, this estimate is given: "Where land is fifty dollars per acre, an acre of good productive apple trees may be planted and brought into bearing for as much more, making the entire cost one hundred dollars. These trees will yield, as an average, four hundred bushels annually, or ten bushels per tree, if the *best cultivation* is given. The annual interest of the orchard, at six per cent., is six dollars; the annual cultivation will not exceed six more, or twelve dollars as the cost of the whole crop on the trees, or three cents per bushel. In many fertile parts of the country, where one plowing and two or three harrowings each year would be all the cultivation needed, the cost of the ungathered crop would be only a cent and a half per bushel."

An acre of forty trees, says Mr. THOMAS elsewhere in his work, with good culture, will average, through all seasons, not less than two hundred bushels, or fifty dollars per year. Instances are frequent of thrice this amount. The farmer, then, who sets out twenty acres of good apple orchard, and takes care of it, may expect at no remote period, a yearly return of five to fifteen hundred dollars, or even more, if a considerable portion is occupied with late keeping apples. This is, it is true, much more than a majority obtain; but the majority wholly neglect cultivating and enriching the soils of their orchards.

Mr. JOSEPH ROBINSON, of Chester, New Hampshire, has an orchard of less than two acres, which produced a crop of fruit in one year for which he was offered six hundred dollars on the trees; in another year he sold his crop for six hundred and eighty dollars. His orchard has been long in full bearing, and bids fair to last for a generation to come. His fruit has been sold in the neighboring markets for from one to three dollars per barrel. It is probable that the average net income of that orchard for ten years past has been more than three hundred dollars a year—the interest of *five thousand dollars!* Another New Hampshire man sold the fruit of four acres of land one season for eight hundred dollars, and last year he received fourteen hundred dollars for the fruit of the same orchard.

OLIVER TAYLOR, of Loudon county, Virginia, has a Loudon Pippin apple tree, which has been in bearing quite one hundred years; and has borne every season for the last eighty years an average of fifty bushels of excellent apples each year—or, an aggregate of four thousand bushels! The tree is still sound, about forty-five feet high, with a spread of branches of about the same distance.

ENOS WRIGHT, of Middlebury, New York, sold the product of two apple trees for one hundred dollars; Mr. HAMMOND, of the same town, sold the product of thirty-three trees of Northern Spy for nine hundred dollars; C. CRONKHITE sold the apples on less than four acres for one thousand dollars, which were immediately resold for fifteen hundred dollars; ROBERT McDOWELL, of York, Livingston county, New York, sold in 1865, from twenty-two trees—nineteen years grafted, ground annually plowed, cropped, and heavily manured, and protected by woods on three sides—after reserving the culls, one hundred and sixty-three barrels of apples for seven hundred and seventy-nine dollars and fifty cents; PERRY SMEAD, of Bethany, New York, for a period of six years, ending in 1867, from an orchard of six acres, had an average annual product of five hundred and eighty-three barrels of apples, realizing an income therefrom of two thousand four hundred and thirty-seven dollars and sixteen cents, besides what were used in his family; S. P. LORD, of Pavillion, New York, bought a neglected, unfruitful orchard of seven acres, trimmed and manured it, and during the ensuing six years, sold from it to the amount of six thousand dollars. A single tree in Middlebury, New York, yielded eleven barrels; four in LeRoy, thirteen barrels each; one in Perry, New York, fourteen barrels of Baldwin apples, which sold for sixty dollars; and one in Castile, New York, fifteen barrels of Gilliflowers. These facts in this paragraph were elicited at a discussion at the New York State Fair, at Buffalo, in 1867.

Apricots and the finer varieties of the plum have often brought from three to six dollars per bushel; and two superior apricot trees have produced one hundred dollars worth of fruit in a season.

Cherries are also profitable. C. A. CABLE, of Cleveland, Ohio, obtained in a single year from an orchard of one hundred cherry trees, twenty years old, more than one thousand dollars. The trees were twenty-five feet apart;

and no other crop occupied the ground, which was enriched and kept well cultivated. Some years ago there was an orchard of seventy May Duke cherry trees, a few miles below Philadelphia, the daily sales from which, during the season, amounted to eighty dollars.

The best early peaches sell from one to three, and even more, dollars per bushel; twenty-four dollars' worth have been sold of a single season's product from four young peach trees, of only six years' growth from the bud. JOHN BURDETT, from his peach orchard of twelve acres, on an island in Niagara River, sold a single crop on the trees, for eleven thousand dollars. In the Boston market peaches have brought from one to three dollars a piece.

Pears will yield from two to five bushels per tree, with good management; and on large trees five times this quantity. In western New York, single trees of Doyenne or Virgalieu pear have often afforded a return of twenty dollars or more, after being sent hundreds of miles to market; and there are Onondaga pear trees in New Jersey which yield fruit enough every season to net their owners thirty dollars a tree. Judge HOWELL, of Canandaigua, New York, has a white Doyenne pear tree, seventy years old, which has not failed to produce a good crop for forty years, averaging about twenty bushels a year for the last twenty years, selling on an average at three dollars a bushel, or sixty dollars a year; while three other large trees of the same variety, one year yielded Judge TAYLOR, of New York, eleven barrels of pears, which sold for one hundred and thirty-seven dollars, averaging forty-five dollars and sixty cents each. CHARLES DOWNING has produced from a single winter-pear graft, five years inserted, four bushels of pears in one season, which readily brought six dollars per bushel in the New York market. Mr. WILDER mentions that the Glout Morceau pears have readily sold, during the Winter in the Boston market, at from one to two dollars per dozen. Dr. BERCKMANS speaks of pears selling in New York at from fifty cents to four dollars a dozen, and in Boston, in December, as high as six dollars a dozen. In TUCKER'S *Rural Affairs*, for 1866, W. SHARP, of Lockport, New York, states that he had been able to obtain for his Beurre Diel pears in New York, on account of the spots on them, only eighteen dollars per bushel, while the Lawrence brought twenty-four dollars. Mr. BACON, of Roxbury, Massachusetts, has in past years sold

pears from one dollar and fifty cents to four dollars per dozen; and the crop of a single tree brought him eighty-two dollars.

The prophecy of an over-production of fruit is dying away. The prognostication will never be fulfilled in America—certainly not within the next century. There are two facts that make it impossible: 1, Our rapid increase of population; 2, the migratory tendency of our people, giving them a disinclination to undertake anything that does not promise an immediate return. If real estate were entailed, or if fruit trees matured like Jonah's gourd, we might get a supply of apples, pears, and peaches to meet the demand, at a reasonable price; but in the present condition of things there is no hope of it. Every farmer in America who plants an orchard within the next twenty-five years, may be sure of obtaining for its harvest a large price; quite disproportionate to the receipts for his grain, vegetables, or cattle. Some of us may live to witness the dawn of the rapidly-approaching strawberry millenium, but the day when the potatoes on the poor man's table shall be flanked with Baldwin apples and Bartlett pears, and when light wines shall be substituted for wretched whisky, is still afar off.

Where to Plant the Orchard?—

The location of the orchard is a matter of capital importance, especially in the West, where success depends upon it. An apple orchard is planted for a life-time, not for a year, like cereals and vegetables, and a mistake in its location tells on the harvest for half a century. So it should not carelessly be assigned to any castaway corner. In the Eastern and Middle States a peculiar location is not so imperative; but where frosts are very severe, and fruit culture capricious, the effect of certain situations must be studied as a science.

In the North and Northwest it is generally agreed that an elevated site is best; and, if practicable, a northern aspect. In the first place, it is less subject to destructive night frosts than the lower places; for the cold air, made chilly by radiation, flows down the hill-sides and settles in the trough of the valley. In the second place, vegetation in sheltered alluvial bottoms is more luxuriant, and the less ripened wood is more liable to injury from frost. In the third place, the clear air of hills furnishes a more probable immunity from lichens than the damper atmosphere of lower levels. Even the texture, color, and flavor of fruit, and

its marketing and keeping qualities are superior on the lighter soils of the slopes. We have advised a northward exposure in the Northwest; this because on a southern slope there is danger of the sap starting and the buds opening prematurely in the Spring; besides which a northward exposure is cooler in the Fall, causing the trees to stop growing early, and to ripen their wood.

The presence of a large body of unfreezing water modifies the conditions of planting in low ground, as the banks of lakes prove peculiarly favorable to the perfection of fruit. THOMAS says: "Along the southern shore of lake Ontario the peach crop scarcely ever fails, and the softening influence extends many miles into the interior."

Dr. KIRTLAND states that orchards on limestone hills invariably afford the best apples, and this claim is corroborated by J. J. THOMAS, and other careful observers. A dry, well-drained soil is undoubtedly of great importance, sometimes determining the question of location.

J. C. PLUMB, an experienced and successful nurseryman, near Milton, Wisconsin, writes: "The facts are, first, that fruit trees must be grown where each year's growth will be hardened on the approach of Winter; second, that they should pass the Winter in as equable a temperature as possible. The first point—well-ripened wood—can be attained as surely in sixty days as in six months, provided the conditions are right, which are—very dry soil and subsoil, and a cool aspect. The second point can be obtained by a free circulation of air, and a shade from the sun during Winter. Still, the cry comes from the far Northwest, 'How can we raise good fruit? Have you any varieties that can succeed in this cold climate?' One man north of St. Paul says: 'Of ten thousand Eastern trees sold here, very few are alive now.' All complain of the 'southwest side deadness,' which is incident to all trees upon too rich moist lands, with warm, protected location, even several degrees south of this latitude—forty-three degrees. But to encourage us, come isolated cases of complete success everywhere. While there is undoubtedly a limit to the fruit zone, as to certain varieties and species, still in general terms, I say to all, with high ground, well-drained, cool aspect, short bodied trees, hardy varieties, and very little Winter shade to the trunks, you can succeed perfectly."

The prime objects to be sought are thorough

drainage and a free circulation of air. It is sufficiently known to intelligent farmers that *drainage makes the soil permanently warm*. E. J. HOOPER, in his excellent Western Fruit Book, advises the planting of orchards on hills, or if in prairie land, on mounds, for the reasons we have given, urging it especially on account of the greater fitness of soils found on such elevations, and the development of fruit in its greatest perfection. A majority of the orchards that have succeeded in the Northwest, have succeeded by a compliance with this requirement, combined with good drainage and more or less Winter protection.

Preparation of the Soil.—On this point there seems to be a wide-spread and fatal lack of knowledge. The ground for a nursery needs as much careful preparation as the soil for a vegetable garden. It needs deep plowing, and a loose, deep soil, drained of surplus water, and supplied with plant-food in proper proportions. Strips of ground where the trees are to stand should be thoroughly subsoiled and rendered fertile by mixing with the soil finely pulverized compost or special manures. Clayey soils are sometimes much improved by an admixture of chip dirt. Leached and unleached ashes and lime may be applied profitably to nearly all fruit trees—especially to the apple, pear, and grape. Pulverized bones are also excellent, and a limited supply of common salt can sometimes be given with great advantage.

Treating of the preparation of soils, that eminent pomologist, Dr. WARDER, of Cincinnati, writes: "Having assigned a portion of the farm to the apple orchard, which should be elevated, and of a light, porous, but productive soil, the plow should be employed wherever its use is practicable, as the best and cheapest means of preparing the soil for planting. Even the holes for setting the trees may be made with the plow, by simply marking out the surface at the proper distances, and planting the trees at the intersections of the furrows. This is done after the whole ground has been well prepared by a thorough plowing, and the trees are then easily planted in the mellow soil, on which they will thrive admirably.

"On low and flat lands that have no good natural drainage, tile should be used, if accessible; but even in such situations, surface draining may be done with the plow, by throwing the furrows together where the rows of trees are to stand. This is what the farmers call

back-furrowing, and should be done two or three times, plowing narrow lands, so as to make little ridges on which to plant the trees. This plan will also leave open furrows between the rows, that will give outlet to the surplus rain water, or at least draw it away from immediate contact with the roots."

Protection of Orchards.—Fruit trees are frequently killed in the North by extreme and unseasonable frosts, and to this danger is added, in the Northwest, a drought, and the sirocco-breath of the Southwest winds of Summer. The Southwest wind is the principal one the people of the Northwest need to protect from, as its extreme force in the growing season often mars the tree and casts the fruit, and its extreme dryness in the Spring is very exhaustive of moisture and vitality. From these three agents of destruction, fruit trees can be adequately protected only by a system of timber belts. The importance of this defense, and the great advantage which its general adoption would confer, can not be overestimated. The efficiency of wood belts as a defense against wind, frost, and drought, is being studied and experimentally tested by thousands of intelligent farmers, and we expect to see them widely adopted in several of the more exposed States, as indispensable to an enlightened husbandry.

In the meantime, there are partial preventives which may be used in the denuded sections. J. C. PLUMB thinks: "Too much sunshine in early Spring is one cause of so many fruit trees dying in the Northwest. The remedy lies in providing abundant mulch in early Winter, to prevent the first warm days of Spring having any effect upon the ground around the plants and trees we wish to protect. Some may object to this, as being too much trouble, but the cost is nothing compared with the benefits; and as this knowledge has cost our individual thousands and our collective millions of dollars the past Spring, let us know hereafter the price of success in fruit culture. As to the extent of this injury it seems confined mainly to below 43½ down to 41° latitude westward from Lake Michigan. Above the northern point named, they were snow and frost-bound until Spring came in her due and regular form, hence both fruits and trees look better as we go north of that line.

"The injuries are confined entirely to the roots of plants, the parts above ground never coming out brighter; but all roots any way

susceptible, were blackened as if subjected to an airing some frosty night. Now mark this—all roots reaching below the first sudden thaw, were left in good condition. This thaw extended six to ten inches, even under ordinary mulch, but in locations protected by unusual mulch of straw, etc., or banks of snow and bodies of ice, as well as those on the immediate north side of groves, buildings, and high fences, now show the effect in a luxuriant, healthy growth of plants and trees therein, while others situated differently in this respect are reduced to the condition of cuttings almost, and in all these situations the frost reached a depth of two to four feet.

"One orchard in this vicinity, used last Fall for a hog pasture, and excessively tramped, suffered the loss of many of the best hardy trees; while another, with the rank Summer growth of grass, with the addition of a heavy coat of straw, all left on the ground through the Winter, suffered no apparent injury, and is now making a splendid growth, with a waist-high crop of buckwheat straw left to fall and rot on the ground. My own orchard, with good culture and no crop last year, is making fine growth, with a two-year old mulch around the trees."

Mr. PLUMB is wholly sustained in his views of the value of Winter mulching. Trees sometimes extend their roots under an old building, piles of stone, or other concealments, and were least affected by our hard Winters. They simply and naturally sought their own mulching. Mr. FINLAYSON, of Mazomanie, Wisconsin, remarked at the Fall meeting, 1868, of the State Horticultural Society, that he had lost no trees that year—so fatal to many orchards. He mulches heavily in Winter, and leaves it on the ground till time to plant corn, and then removes it and tills the soil. All the trees, he had observed, that were treated in that manner were in good condition and were bearing more or less. His trees were on a southeast aspect, and yet they did not blow as early as did those of his neighbors, where there was no mulching. He was satisfied that well-mulched trees would survive hard Winters.

Another cause of the loss of fruit trees, in some sections—*viz.*: Summer drought—has been investigated and explained by Judge J. G. KNAPP, of Wisconsin, who has written much and ably upon the climatic influences of the Northwest upon tree-life. In a paper recently read before the Wisconsin Horticultural Society, he reviewed the climatic conditions of

North America, dividing it into the mossy, the arborescent, the alternately woody and prairie, the prairie, and the arid regions. He has showed the difference of climate and vegetation in each, traced that difference to the climatic conditions of each; and held that those trees that flourish in the arborescent region could not succeed in the alternate region of wood and prairies, as it existed in the Northwestern States, without artificial means, to supply them with moisture during the Summer droughts, incident to that location, between the arborescent and prairie regions; and concluded that the desired trees might be reared in the Northwest if they were properly supplied with moisture. He then proved the deficiency of moisture from the smaller rain fall of the West as compared with that of the Eastern States, and by the greater evaporating power in the atmosphere, and estimated that there was a deficit of at least twelve inches of water falling on the surface of the ground.

"If," continued the judge, "this deficiency of moisture was supplied by watering or irrigation, then fruit trees would succeed here as well as further east, especially if they received proper protection by tree belts, and such Winter mulchings as would save the roots from the effects of frosts, consequent upon a want of snow to cover the ground.

"Apple trees, peaches, and plums, grow with a tap root, if allowed to stand where they are first planted, and tap-rooted trees alone withstand the droughts of our Summers. Then I ask would not apples, peaches, and plums do the same thing? And if they would, does it not teach us that the true way to secure an orchard would be to plant seeds where the trees are designed to grow? They can be grafted at any age afterward, without disturbing the roots. Such a course might secure good orchards.

"Next to planting seeds where trees are to grow, it is advisable to plant trees that are very young, and so plant them that roots answering to tap roots would be encouraged to grow instead of side roots. Trees thus planted, or planted deep, would not make rapid growths at first, but I believe they would live more years, in this country where we have neither rock bottoms, hard-pan, nor cold wet ground below."

BUFFON held that trees were animals without the means of locomotion. More recent naturalists have shown more definitely that the roots are the mouths and the foliage the stomach, and that vegetables have organs of secretion, digestion, selection, generation, and even

of sensation. J. C. COVER promulgates the droll theory that "trees become sickly from usual causes familiar to men, as bad colds, impure food, overeating, and too fast growing, sourness of stomach, inflammations, etc. We often see trees very sick, especially after a long season of fine weather and good living, and of late hours and wakefulness. They eat too much, grow too much and too long, and are sick of it; and unless reclaimed by artificial means, may die of it."

"Now," continues Mr. COVER, "the right practice in my experience is about this: Cut away the surplus top made by our overrich soil and intoxicating climate. Do it in July. Finish by cutting or breaking off the water sprouts, which may break out from body and base in August and September. Your trees will early stop growing, prepare for Autumn freezing and Winter slumbers without protection, and thereafter no difference about the cold weather ten degrees or fifty below zero. At the Spring waking and new life, your trees will come out healthy and empty, of course, after the long hibernation, but sound and hungry as the cubs of a grizzly bear. Such has been my practice for many years, and I have lost no trees."

We have already set forth the necessity of prairie farmers planting their orchards on the coolest, highest locations—if possible, on the cold side of swells and bluffs. Thorough drainage is more imperative in the Northwest than any where else in the country; for it warms the roots and sends them down to depths where moisture never fails.

A conductor is sometimes effectively used to draw frost from blossoms, described thus: Take a pole and set it alongside of the peach, plum, or other fruit tree in blossom, so that it may reach five or six inches above the highest branch; make a straw rope an inch and a half thick, and tie one end to the top of the pole, and let the other end descend to the ground outside of the branches, terminating in a large tub of water at the foot of the tree, and it will often draw the water and attract the frost from the blossoms.

The philosophy of this prevention is this: "The rope, which was previously wet, was a conductor of heat; the air, and of course the limbs of the tree, become colder in the night than the earth—the rope conducted the heat from the earth to the tree, thus keeping up an equilibrium and preserving the tree from frost." Attaching a rope to each tree of choice fruit, and thus letting it permanently remain through

the Winter and Spring, the fruit would probably be largely secured from the effects of the frost.

Whether any advantage, observes Judge KNAPP, can be derived from knowing the law governing cloudy days and nights, which check the radiation of heat into the air, remains for the future to disclose. But we can, by imitation of fogs, derive great benefit from a principle involved in the disposition of the strata of the atmosphere, in affording protection to vineyards, orchards, and gardens from the effects of the clear cold nights in Spring and Fall. Such spots can be covered with an artificial fog; thus—let the place to be covered be surrounded by a thick belt of trees which shall nearly prevent any current of air from moving along the surface of the ground from without; and then, if fires giving off thick moist smoke be lighted in the grounds, the smoke will spread out over the piece inclosed, at about the tops of the tree belt, giving nearly all the advantages of a real fog envelop. Crops of fruit, etc., might thus be saved, that would be destroyed without such protection. This plan is followed in some places in Europe.

How to Select Fruit Trees.—There are a few simple rules in the selection of trees, which, if followed, will generally insure success.

1. Select the tree that has the greatest amount of fibrous roots. With a proper growth of roots you can get a good top; but with a large top, ever so finely proportioned, and little or no roots, your tree will become sickly, and sooner or later die. Some varieties of trees should have more roots than others; as, for example, the dwarf pear or quince should have at least three times the amount of fine roots that the standard pear of the same age needs. An evergreen is entirely worthless without fibrous roots.

2. Do not select a whipstock of a tree. Such trees have usually been crowded in the nursery, and very seldom thrive, although they may be "headed back," and anxiously cared for. The tree should be short and stocky. Always examine to ascertain if it is sound at the heart. The Wisconsin Horticultural Society advises planting trees with heads only two feet from the ground.

3. The tree should be properly and evenly branched. Trees that have been crowded in the nursery often have a majority of their branches opposite on two sides only; and are

what nurserymen term codfish-shaped trees. See that your tree has branches on all sides. For western planting, trees should be branched low, as the wind has then less effect upon them; and the trunk of the tree is more shaded by the branches during the Winter months. In a word, hardy sorts, plenty of roots, low heads, stocky forms, and moderate growth for severe climates.

Hon. MARSHALL P. WILDER, President of the American Pomological Society, gives the requisites of a good fruit tree: A good tree must possess: 1, Health, or freedom from constitutional disease; 2, hardiness, or the power of resisting extremes of heat, cold, and drouth; 3, fertility or productiveness of fruit; 4, persistency of fruit, or power of adhering to the tree; 5, vigor of growth, or productiveness of wood; 6, persistency of foliage; and 7, a good habit of growth. Those which unite these characteristics in the highest degree are most valuable. A good fruit must be: 1, Of the best quality; 2, it must possess durability, or the property of remaining sound after being gathered; 3, size; 4, color; 5, form.

Young trees are better for planting than those which are older—small trees are more easily handled, and are surer to grow than large ones. If one purchaser wants large trees, by all means let him be indulged; he will have to pay in proportion; he will have more wood for his money, more weight to carry, or more transportation to pay for; more labor in planting, and vastly increased risk in the life of trees; but let him be indulged with his five-year old trees, while his neighbor, for smaller sum invested, with less freight, less wood, less labor, and infinitely less risk, will plant his maiden trees, and five years hence will market more fruit.

Two years from the graft or bud is long enough for the apple to remain in the nursery; this is true of most varieties, but there are exceptions, for some slow-growing kinds require a longer period to attain sufficient size. The plants should be stocky and branched, and they must be taken up carefully, so as to preserve the roots. Hardy and productive kinds of the second quality are more satisfactory than those fruits of greater excellence which have not these prime qualities of the tree. It is rare that we find all excellence united in one individual. For the family orchard, it is best to have a succession in the time of ripening; the same is true of an orchard planted for stock feeding, but in the commercial orchard, where

a large quantity of fruit is to be produced for shipping, it is found best to plant only a few varieties, and these should be productive, hardy, and of such a character as to bear transportation, and to command a ready market; they should be well known and good looking—less regard being had to their superior quality as table fruits, than in the amateur or family lists.

Dr. KENNICOTT says: "Plant small trees. The cost is one-half less at the nursery, less in transportation, and in planting you will lose scarcely any at all. You can form the tops to suit yourself. Form the heads low. This, on prairies, is absolutely necessary to success."

Mr. BUCHANAN says: "Apple trees two years old are better than those of more advanced age; and an apple tree transplanted at that age, other things being equal, will produce fruit as soon as one transplanted at four years old, and make a more healthy tree."

Transplanting.—Taking a tree from its native bed and transferring it to another is always an act of violence, injurious to its vigor, if not perilous to its life. The greatest care is requisite to preserve its vitality from being seriously impaired.

Autumn or Spring Planting?—There has been much unprofitable discussion of the question whether it was better to transplant in the Autumn or Spring; unprofitable, because the question can not be answered categorically. It depends on circumstances. As THOMAS well says in his *Fruit Culturist*, "As a general rule, 'the proper season' for the removal of trees is at any period between the cessation of growth in Autumn—usually a little later than mid-autumn in the Northern States—and its re-commencement in Spring. The earlier in Spring the better; but if deferred till the buds are much swollen, the roots should be coated immediately with mud, and kept moist till again set out. Transplanting may be performed in Winter, whenever the ground is open, and the air above freezing; but roots which are frozen while out of the ground, will perish unless they are buried before thawing."

Farmers and orchardists generally transplant their young trees in the Spring, moved thence, no doubt, as much by the vernal instinct, and the vague inclination to plant something as by any special fitness in the season. It is now generally held by the highest authorities, that Autumn is the best season for transplanting apple and other hardy trees, providing that the soil

is friable and well drained, and that the young trees receive adequate after-protection.

The organs of nutrition of the tree, during Winter, are suspended or nearly so; the demand for fluid increment by the tree is so small, that the lacerated radicals can easily supply it, besides domiciling themselves to their new locality; so that by Spring they can supply the full demand of the plant for an active growth. Winter will enable the tree to renew its granulations, before the exhaustion of the store of food laid up the year previous, so that when April comes again, it begins to grow without interruption. "In the Fall the soil is warmer than the air; the formation of roots proceeds while the branches are dormant; when Spring arrives, the balance of the tree being in a great measure restored, growth commences vigorously, and the plant becomes established and able to bear up against Summer aridity."

ANDREW S. FULLER, a New York horticulturist, says with emphasis, "We would never plant evergreen trees in the Fall, but always in the Spring, just at the time they begin to grow." The *Wisconsin Farmer* says: "Tree planting may be as safely done in Autumn as in the Spring, in all common cases—especially if done early enough to enable a tree or shrub to become well and naturally imbedded in the soil, by the action of rain and time. But in all cases of Fall planting, we deem it indispensably essential to raise a mound around the tree, from six to twelve inches in height, and from three to four feet broad; and in making this mound, care must be observed, not to take the earth so near the tree as to leave a low circle around it, to allow the surface water to settle around the roots, and freeze or drown out the tree. We believe this is the most common cause of failure in Fall planting. Plant as early as the middle of October, and leave the ground around the tree level, as in Spring planting, for two or three weeks, until the rains usually occurring at that season of the year, have fallen upon and settled the ground; then go before it freezes, and put up the mound for Winter."

WILLIAM SAUNDERS, the superintendent of the United States Agricultural garden at Washington, favors Fall transplanting—as soon as the leaves change color, stripping off the foliage before removal—at the commencement of the dormant season, while the ground is several degrees warmer than the atmosphere, and acts as a hot-bed for the roots to get well established for Winter, and be prepared to enter upon an early and vigorous growth in the Spring.

But Spring setting will doubtless still continue much in vogue. Transplanting trees, vines, and shrubs late in the Spring, even after new wood has grown three or four inches, if the new wood and the leaves be removed and the roots be left nearly intact. There are many conditions rendering Spring transplanting preferable in certain cases. Tender trees, for instance, or those of unripened wood, taken to a colder climate with mutilated roots might be in danger of winter-killing. Even hardy trees might be likely to perish if set out on a heavy, undrained soil. In these cases, it would be advisable to heel in the trees, covering them on some dry knoll in well-pulverized soil, being careful to keep mice or other depredators from the mound.

Taking up Trees.—Too much care can not be taken in removing the trees from the nursery, nor in protecting them from the parching effects of the sun and air. Trees are often cut or torn up by the roots, as if the trunk and branches were the only thing necessary and the roots superfluous. The proper way is to open a trench on each side of the tree, with a common spade, keeping the edge toward the tree so as not to cross any of the roots. These trenches should be far enough from the tree to avoid the main roots and deep enough to go below all, including as much of the tap root as possible. This being done, the tree may be pulled up with the roots almost entire. Many a fine tree has lingered awhile, and finally died for want of its native tap root. Many who once said, "let the tap root be cut off," now take sides with the backwoodsman, who contends that the tap root is essential to the life and health of the tree, as it goes down deep into the earth to supply the growing stem with moisture and mineral matter during the dry season of the year, when the lateral roots can not find half so much moisture as escapes from the leaves. Therefore, every tap root should be retained as perfect as practicable, and be encouraged to grow. A large hole should be made with a crow-bar, several feet deep where the tree or vine is to stand, and a lateral root, when there is no tap root, should be encouraged to grow in the hole.

Treatment of Nursery Trees.—If the trees come to hand while the earth is too wet to receive them, or have been too long on the way and are much dried up, immediately immerse their roots in a bed of liquid mud. Then either bury their roots in the ground with the tops in

a leaning position near the ground, so that they can be shaded and watered conveniently, if the weather be dry; or place them in the cellar, if the weather be wet, or place them, if dry, in water from twelve to twenty-four hours.

If the trees have become very dry, it will be necessary to bury them entirely, root and branch, by putting them in a trench, and covering them with earth that will touch every part of their roots and branches. They must be watered frequently, and should remain in this condition from a week to ten days. Trees that have become quite dry, may be perfectly restored when treated in this manner, and when transplanted will grow vigorously, while those that were not treated in this way will be very apt to die.

Cutting Back the Branches.—Before planting it is always advisable and sometimes quite necessary to strip off the leaves, and cut back the top, to re-establish the equilibrium that has been disturbed by the laceration and removal of a portion of the root. It is sometimes necessary to cut off one-half or more of the top. The leaves perform the function of lungs, and when the supply from below is greatly reduced, while the leaves continue to make an undiminished demand and to throw off an undiminished quantity of moisture, it produces exhaustion, and death frequently ensues.

The *Horticulturist* says: "There is room for study in the practice of heading in, because of the vigor of growth and power of producing strong new shoots, being much greater in some sorts than others. The peach, for instance, may be cut back to within two feet of the crown, leaving not a limb or twig, and yet the tree, in the ensuing Fall will be found, under good cultivation, to have made four or five strong shoots, each as many feet long, and with abundant lateral branches. Pursue the same course with the apple, and nine times out of ten the result will be only a few feeble shoots of four to six inches, with a dead tree the following Spring. The pear, when worked on the quince, will bear much more severe pruning back than when on the pear stock; and further, some varieties will endure more severe pruning than others. The grape, when cut back two or three buds, grows vigorously; but if left unpruned, it struggles a year or two, produces a few imperfect bunches, and is, perhaps, dead. These are some of the many variations that an observing horticulturist will notice on short practice."

Marking Off the Ground.—After the soil is

thoroughly and deeply prepared, twenty inches or two feet deep, as already set forth, it is ready to mark off with the plow in two directions, so that the intersections of the furrows shall be at the stations selected for the trees—twenty feet apart has been quite generally recommended by our Northwestern fruit culturists. This is the best way to dig the holes, for the furrows may be made quite deep enough for planting, and by thus preparing all the ground the holes are ready made for the trees to be planted. It is not desirable to set the trees deeply, and some writers have even advocated planting them on the surface, without any excavation, save covering the roots with a little fine soil.

Distance of Trees Apart.—Wide planting was formerly recommended; but close planting has recently many advocates, who advance cogent reasons for crowding the trees within twenty feet, placing the upright and wide-spreading varieties alternately. In the first place it is now conceded that the land appropriated to the orchard is to be given up to the trees, and should not be used for other crops, therefore there is less necessity for room. In close planting the whole ground is shaded, and kept from the baking influence of the sun, and thus it remains more loose and friable than when exposed. The crowding of the trees also protects them, in a great degree, from the severity of the cold in Winter, and from the injury incident to the sudden changes of our climate; but in exposed situations this close planting shelters them from the trying winds

DISTANCES FOR PLANTING TREES, ETC.

Apples, standard.....	20 to 30 feet
Apples, dwarf.....	5 to 8 "
Pears, standard.....	20 "
Pears, dwarf.....	10 "
Peaches, headed back.....	12 "
Cherries, standard.....	20 "
Cherries, dwarf.....	8 to 10 "
Plums, standard.....	15 "
Plums, dwarf.....	8 to 10 "
Quinces.....	5 to 8 "
Grapes.....	10 to 12 "
Gooseberries and Currants.....	4 "
Raspberries.....	4 "
Blackberries.....	6 to 8 "

For the above distances the following is the number of trees required for an acre:

At 4 feet apart each way.....	2,720
" 5 " " " " ".....	1,742
" 6 " " " " ".....	1,360
" 8 " " " " ".....	680
" 10 " " " " ".....	430
" 12 " " " " ".....	325
" 15 " " " " ".....	200
" 18 " " " " ".....	155
" 20 " " " " ".....	110
" 25 " " " " ".....	70
" 30 " " " " ".....	50
" 33 " " " " ".....	40

It is not extravagant to say that all the hill-sides of the West ought to be given up to orchards. In planting these, the rows should be horizontal, or around the hill, so that there

might be no up and down cultivation, and as there is left a strip on the line of the row not cultivated, it will form a terrace that will prevent any serious washing. If the trees are planted quite thick one way, and the cultivated space narrowed as the trees get size and shade the ground, they can be left with very little cultivation in a few years, if a good mulch is annually applied to the intervening spaces. In any event the trees must have the benefit of the whole soil, to insure vigor and health.

Setting the Trees.—Mr. THOMAS, in his Fruit Culturist, sums up what he regards as the essential requisites for transplanting, as follows:

1. A previous preparation of a rich, deep bed of mellow earth to receive the roots, and land which can not be water-soaked.

2. Removing the tree with as little mutilation of the roots as practicable.

3. Paring off the bruised parts.

4. Shortening-in the head, in a greater or less degree, to correspond with the necessary loss of roots.

5. Immersing the roots in mud, at planting [if the soil be previously dry].

6. Settling the land with water [unless the soil be clayey].

7. Planting no deeper than before.

8. Staking or embanking, to prevent injury from the wind.

9. Watering the stems and branches only, before the appearance of the leaf.

10. Mulching, where danger of midsummer drought is feared.

To this agricultural decalogue might be added an eleventh: As a general rule, apply no manure to the roots, when transplanting, unless it be finely pulverized compost; fresh manure is inflammatory, and acts as an agent of decay, because the fractured roots are not able to receive it as a stimulant. The best way to fertilize, is to apply the manure to the surface around the trunk; it acts as a mulch; the ground gradually absorbs it, and the delicate spongioles of the roots can receive no food except in a liquid form. Special manures may be also given, as already indicated.

The tree is a vitalized being, manifesting itself through delicate organs, whose functions ought to be carefully studied by every successful fruit-grower. Trees, in transplanting, must receive tender treatment. No satisfactory results can be expected, if, with Uncle TWIGGS,

"I rams 'em in,
Now thick, now thin;
For what cares I
If they grow or die."

Mr. WEIR, in the Illinois Agricultural Report for 1865, urges that it is necessary to *lean trees from twenty to thirty degrees* towards where the sun is at two o'clock, or about ten degrees west of south. "I have," he says, "leaned them as much as forty-five degrees, and, when the trees were six years set, they were, many of them, perpendicular. The reasons for leaning them in this way are:

- "1. The general course of our strong winds is from the southwest, and, if the trees are planted upright, they would all be leaned to the northeast, which would not look well, and would be very detrimental to their future prosperity.

- "2. When trees are torn from the ground and transplanted, the circulation of the sap, until they get established, is very feeble, and, if exposed to the full glare of the sun, on the south side, in our hot, dry climate, is liable to be dried up, thus killing that side of the tree.

- "3. It is a well-known fact, among tree growers, that the hot sun, in Winter, injures and kills more trees than the severe frost. When trees are planted upright, or leaning to the northeast, as they will eventually when so planted, the sun has full effect on the south side, causing the sap to flow and bark to loosen early in Spring, then, freezing suddenly at night, bursts loose and spoils that side of the tree.

- "4. It retards the blossoming in the Spring."

The tree should not be set more than an inch or two deeper than it stood before. THOMAS says *no deeper*. It is well known that a large proportion of transplanted trees die because they are set too deeply in the earth. When the soil is clayey, peaty, or permanently damp, if it can not be drained, the tree should be set on the surface, after it has been plowed, and light earth should be sprinkled over the roots.

If the ground be mellow and dry, set the tree in the unfilled hole on the pulverized soil, and spread out every root and fiber in its natural direction, having previously examined them, and cut off, with a sharp knife, those portions that have been torn or wounded in digging or transportation. Then sift on the mellow earth, shaking the tree gently and thoroughly working the earth beneath and around every root, so as to exclude the air. In dry weather, in dry soil, pour in a pail of water and leave a slight basin about the stem, to retain the moisture until it can soak into the earth. In other soil, the earth should be left slightly concave, to allow of settling, and in

the Fall this should be made prominent for mulching purposes. Do not tread the soil firmly about the tree; it need only be solid enough to furnish support.

It is now generally conceded that the ground occupied by fruit trees should not be drawn upon for any other vegetation—either for harvest or pasturage. Cattle should never be admitted to the orchard. Grass, clover, or other green crop may be grown and carefully plowed in yearly, or left to decay upon the ground as a mulch.

Should the cultivator feel unable to surrender the land exclusively to his orchard, hoed crops, like corn and potatoes, will be preferable to any other. The trees should have some culture for a few years; this, and a thorough previous pulverization of the soil by deep trenching are most important.

Transplanting at Night.—The *Working Farmer* says: A friend, in whose power of observation we have confidence, and who is an accurate experimenter, informs us that in the Spring and Summer of 1867, he made the following experiment: He transplanted ten cherry trees while in blossom, commencing at four o'clock in the afternoon, and transplanting one each hour until one in the morning. Those transplanted during daylight shed their blossoms, producing little or no fruit, while those planted during the darker portions maintained their natural conditions fully. He did the same with ten dwarf pears after the fruit was one-third grown; those transplanted during the day shed their fruit, while those transplanted during the night perfected their crop, and showed no injury from having been removed. With each of these trees he removed some earth with the roots.

A single experiment is not sufficient to demonstrate so important a principle as is here inferred. But philosophy tends to corroborate it. It is a well established fact, that when the sun is shining brightly, plants are performing their most active organic operations, and when it goes down these operations of growth are mostly suspended until it rises again. The arrest of the process of nutrition in men or animals at a time when it is being actively performed, is commonly marked by certain uniform signs. When persons recover from diseases in which the process of nutrition is suspended, the hair often falls off, and the nails show a transverse mark at the point which was then its root.

Vigorously growing plants—and plants are growing rapidly at the time they are in blos-

som—by the most transient interruption of their common supply of nutriment, are quite likely to lose their blossoms, and to suffer an arrest of development of their fruit. These trees were removed at a time when their organic operations, or those of growth, were being performed with greatest energy, and they would consequently suffer the more, while those which were removed later, or after the sun went down would naturally suffer much less. Of course trees should never be subjected to the violence of a removal at the period of fructification when removal at any other season is practicable.

After Culture.—If any blossoms or buds appear on a recently transplanted tree, vine, or plant, pluck them off. If the fruit be left to perfect, it will be at the expense of the vigorous growth of the plant, and a corresponding depreciation in quantity and quality of fruit the next season. Growth and fruitfulness are antagonistic processes, and should not be suffered to proceed at the same time in an immature tree.

Watering the tops of trees in the evening, may be done as often as convenient, with great advantage. It tends to soften the bark and buds, and enables the tree to put forth its tender leaves directly.

Having already set forth the necessity of previously enriching and pulverizing the ground intended for the trees, and the inexpediency of applying any fermentable manures to the roots in transplanting, it only remains to say that the orchard should thereafter be kept well fertilized. To protect and enrich the roots, cover the surface with straw, leaves, or very coarse manure, to decay gradually. If set in the Spring apply well-rotted manure in the Autumn; if set in the Autumn, mulch pretty liberally with coarse manure or litter before the ground is frozen. When trees get a good start, and are making roots and limbs rapidly, we do not know that you could hurt them with manure, lime, or ashes, in any reasonable quantity. It is well known, as a general thing, that all sorts of trees, vines, and shrubs, are woefully neglected, and suffer for want of manure pabulum.

Though we have incidentally spoken of the custom of plowing orchards for four or five years after planting them, yet it is of very doubtful utility. The roots of a tree, if undisturbed, will generally keep near the surface of the ground, and plowing cuts them off or lacerates them. Many fine orchards have been sadly injured by such treatment. Mulching, or top

dressing with ashes or other fertilizers would seem to be much preferable.

Some permit the sheep to run in the orchard, contending that they eat the wormy apples which drop early, and that the apple crop is therefore almost entirely unaffected by the codling moth, and also that they remove very little from the soil that is not returned. Others declare that where the orchard is not kept properly mulched, the next best thing is to allow hogs to ramble and root there, stirring the soil around the trees, but not cutting the roots like the plow. They also eat decayed and wormy apples as they fall, and are destructive to grub worms and vermin, and thus render the orchard a good service. THOMAS says, "more trees are lost from the neglect of after culture than from all other causes combined."

Mulching.—To protect young trees from drought, frost, or sun, nothing is more effectual than a mulch—a four to six inch covering of straw, loose litter, tanbark, chip dirt, or forest leaves about their trunks. This keeps the earth light, warm, and moist, and renders the too-often-injurious process of watering unnecessary, except in extremely dry sections or seasons.

Did you ever lift a board from the ground in warm weather? If so, you have found that the ground was moist, however severe the drought. This is mulching. But keeping the ground moist is not the only benefit of mulch. The moisture deposited beneath the mulch is the warm air coming in contact with the cool ground. This air always contains more or less fertilization in the form of vapor. And this vapor is arrested by cool air coming in contact with warmer. Everybody can see, if they will, that a piece of land kept covered instead of bare, will increase in fertility, while a piece left naked will continually grow poorer. If a farmer leaves a covering of grass upon the ground during the Winter, he will find it will pay him well in the increase of the crop, while the naked ground is liable to lose not only what grass there is by winter-killing, but less and less grass will grow where it is all fed off close in the Fall. An apple tree will be made to grow and bear fruit, simply by covering the ground with stones around the roots.

Trees must not be kept permanently mulched, for this would exclude much of the light, heat, and air, all of which are essential to a healthy vegetable growth. The *Horticulturist* says: "We have found our best results to come

from stirring the soil frequently until the Summer heat, then applying our mulch, removing it again early in October, and again applying it as soon as the ground is well frozen. By this course we give our roots, in the Spring, the benefit of the elements they need to make perfect growth; we keep the powerful rays of the midsummer sun away, and thus give them a longer time to mature wood and root; we give them in Autumn the action of the atmosphere to enable them to gradually harden the root and branch, and fit it for the extreme cold of Winter; and in Winter, after having frozen them to sleep, we cover them so they may not be awakened from week to week, but continue their nap until such time as, by the natural order, they should again pursue their appointed course."

Low heads and thick planting prevent the necessity of culture eventually, and then their own shade and fallen leaves constitute the best and a natural mulch for the orchard.

Pruning.—"Why?" The third inquiry embraced in the title of this volume, should be assiduously studied until it can be intelligently answered by every man who tries his hand at pruning. Pruning is an art; yet it is practiced so clumsily, that it is frequently worse than the waywardness of vegetation which it is intended to cure. Better straggling limbs and ligneous deformity, than the horrible hacking and artificial maiming exhibited by thousands of orchards. P. T. BARNUM, the famous showman, who has a keen relish for a joke, especially when it is against himself, tells how he (once) tried his hand at pruning, seizing the knife and saw in the absence of his gardener, and rushing out to restore symmetry to his favorite orchard. He went through it like a mowing machine, slashing right and left, clearing off the immature and superfluous "sprouts," and reducing the whole to the classic line of beauty. In an hour, when he had worked himself into a fine perspiration, the gardener reappeared, and the proprietor suspended his surgical operations to receive approval. His astonishment and mortification may be imagined, as the afflicted gardener raised his hands reproachfully and exclaimed, "My God! You have cut off all the grafts!"

Pruning has two prime objects: 1, To give form to the tree; 2, to promote the growth of fruit. In effecting these ends, two propositions are kept in view:

First. No well-managed fruit tree is ever allowed an undisturbed natural growth.

Second. No skillful and vigilant orchardist ever makes much use of the knife or saw on trees which he has had the exclusive management of.

Pinching Off the Buds.—The skillful and watchful fruit-grower forestalls the necessity of employing the pruning-knife, by an early and constant use of his hand, in pinching off the superabundant shoots and buds while yet soft and green. In proportion to his skill he prevents all wanton growth, and thereby saves the strength of the soil and the vigor of the tree, which would otherwise be expended on useless limbs. A much worn pruning-knife, tells of a thriftless gardener.

Thumb-and-finger pruning is the best of all pruning. The saw is almost entirely out of place in an orchard. This pinching back does not disturb Nature. It is apt to be done judiciously, for breaking off the buds and shoots when in a succulent state can hardly produce harm. If a branch grows too rapidly, is likely to usurp too much space, it should be pinched back for one season, to allow the rest of the tree to come forward. Insist upon equality. Every tree can be made perfectly symmetrical by a little care in pinching in, if begun when it is young. Everybody can prune in this way—even BARNUM might venture on it. It requires no particular skill—only the exercise of a little common sense. Rubbing off all superfluous buds as they appear, keeps the tree clean, and the growth in the proper channels. Some of the handsomest and most profitable orchards we have ever examined, never had a knife or saw about them.

Pruning in Moderation.—The pruning-knife and saw do, on the whole, nearly as much harm as good. The remedy is sometimes worse than the disease. Cutting off a large lower limb of a tree is a terrible shock, tending to impair its constitution and shorten its life. It throws the root and top out of equilibrium; and it hurts the juices of the whole tree, and begins a rotting process, attended with fungus, where the wood is exposed. Some ignorant farmers imagine that "pruning is pruning," and so they slash away, in the delusion that the more they mutilate and lacerate the better. And so we see great handsome apple trees and standard pear trees murdered, and other cripples tottering on the meadow, with dead limbs, naked wounds and bleeding arteries—perishing subjects of malpractice!

Prune gently and carefully. Avoid heroic remedies. As a rule a limb that can not be

cut off easily with a pocket-knife, ought not to be cut off at all. The philosophy of pruning is easy. Examine every tree in the orchard, especially in the *young* orchard, early and often, and remove all twigs and new shoots which seem likely to clash with each other in future years. *Keep the heads of the trees low*—in the Northwest *very* low; this is one of the objects of pruning. While cutting to prevent a too crowded top, avoid the other extreme—a too open one; for ours is a hot sun, and partial shade for both branches and fruit is desirable.

When it is necessary to remove a limb, take it off close to the trunk smoothly, shave the wound with a sharp knife, and paint with white paint, grafting salve, or gum shellac, to prevent rotting.

When to do Heavy Pruning?—1, Never; practice disbudding vigilantly, so that heavy pruning will not be necessary; 2, but if it be necessary, on account of your own or some other man's negligence, do not do it all at one time or in any one year. There is but one time pruning should be absolutely interdicted, and that is when the wood is frozen. When in that condition it should never, on any account, be cut or disturbed or handled in any manner.

As to the precise season that is best for pruning, Dr. WARDER lays down the postulate, "*Prune in Winter for wood, in Summer for fruit.*" Mr. SAUNDERS, Superintendent of the United States Agricultural Garden, at Washington, calls this "an axiom," and concludes that "strong growths should be pruned in Summer; weak ones in Winter."

"Summer pruning can be useful where wood-growth is to be checked, and it will be repressed in proportion to the severity of the removal of foliage. Fruit trees, when planted in a generous soil, frequently attain a luxuriance incompatible with a fruitful habit, and their flowering may be somewhat hastened by judicious Summer pruning or pinching, so as to retard wood-growth; but care must be exercised, and much observation and experience are requisite, before the object can be safely attained.

"Winter pruning invigorates wood-growth. When a portion of the branches of a tree is removed after the fall of the leaves, the balance of growth is destroyed, and the roots have the preponderance; the remaining buds will now shoot forth with increased vigor—an important consideration with trees or vines that have become weakened from overbearing, or any other

cause, imparting new vigor to weak and sickly plants."

"Never prune," says the *New England Farmer*, "when the sap is in full motion, as in April and May, and it is better not to prune in March; a few sunny days will start the sap even in that month. The reason for this is, that the tubes that conduct the sap to the branches are full, and if cut off, the sap will run out. When the sap comes to the light and air it trickles down the bark, and undergoes a change that is very unfavorable to the tree. It frequently kills the bark entirely, and finally the tree itself.

"By the middle of June, a large amount of the sap has gone to the branches and exhausted a portion of it in expanding the leaves and flowers; most of the remainder then returns down the tree, immediately under the outer bark, in a thickened state, and this makes the annual growth in the diameter of the tree. *When this is the state of things, then is the proper time to prune.* The wound made will rarely bleed, and it will heal even quicker than at any other season of the year. This period lasts from about the middle of June to the middle of July, when the second growth, so called, commences, and the sap is again active in the pores of the sap-wood.

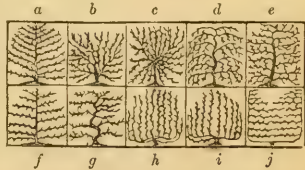
"It is safe to prune, also, after the leaves have fallen in October, or at any time afterward until the sap is active, but the wounds made will not heal so readily as they do in June. The black part, that may be seen in almost any orchard, is evidence that the trees were pruned at an improper season."

At a meeting of the Fruit Growers' Society of Western New York, fruit culturists of experience were nearly unanimous in the opinion that all severe or heavy pruning should be done in Winter, or before the flow of sap in Spring; that the wounds made in Winter should be covered with paint, tar, and whiting, or what is best, shellac in alcohol; that if performed in Spring, the sap runs out and injures the wood of the wound; and that after the leaves have expanded, the loss of the foliage injures or checks the growth and vigor of the tree. There is no doubt that Winter pruning is practicable, subject to the conditions laid down by Dr. WARDER.

Dr. JOSEPH HOBBS, President of the Wisconsin Horticultural Society, recommends that pruning be done in June, when trees finish their "first growth." J. C. COVER, one of the most careful observers, says: "I recommend the month of July for pruning all the apple

kinds, except the wild crab, which perfects its growth in June, and should therefore be pruned in that month—I think about the 20th. This is assuming that all trees, of whatever kind, should be pruned at or about the close of their first growing stage, the time of course varying with the different kinds. And such is precisely my assumption. Forest trees complete their annual growth early in June, and by the last of that month their growth of wood is fully made. The cherry, plum, and pear complete the same process early in July, and the apple by the 15th to the 20th of July." Pruning can also be safely done at the end of the second growing season—in the Fall.

The following interesting illustration of the various modes of training trees in England, where the useful and ornamental are combined, is taken from LOUDON'S *Encyclopedia of Gardening*. It is only necessary to add the terms by which each form is known: *a*, the herring-bone fan; *b*, the irregular fan; *c*, the stellate fan; *d*, the drooping fan; *e*, the wavy fan; *f*, the horizontal; *g*, the horizontal, with screw



stem; *h*, the vertical, with screw or wavy shoots; *i*, same, with upright shoots; *j*, the double lateral.

Pruning for Fruit.—Every tree develops two sorts of buds, one of which produces leaves and the other fruit. The fruit buds are generally plump and obtuse at the end, while the leaf buds are more slender and sharper. THOMAS states, the generally recognized principle, that whatever tends to free sap circulation, and so to rapid growth, causes the formation of leaf buds; while whatever tends to retard the flow of sap, and so accumulate it in any part, induces the production of fruit buds instead. The multiplication of fruit buds and the increase of fruit, may be effected by checking the growth of vigorous trees; but this should be cautiously practiced. Leaf buds are changed into fruit buds by breaking off the ends of lateral branches in Summer, and so turning back the flow of sap upon the leaf buds.

Root Pruning has been tried to a limited

extent—mainly in the nursery or the amateur's garden. It consists in promoting fruitfulness by digging a trench around the tree a few feet distant, and severing a portion of the roots. It tends to dwarf the tree, and can not be successfully practiced except on young trees, or in fertile and well-pulverized soil.

Propagation.—There are five methods of propagating fruit trees: 1, By planting the seeds and thereby producing new varieties; 2, by grafting; 3, by budding; 4, by layers; 5, by cuttings.

Planting.—If you have your ground prepared, and it is dry or well-drained, you can plant your seed in the Fall. Some, however, prefer to pack such seed in sand, and keep it cool and moist until Spring, and then plant it as early as it can be got in the ground. Plant an inch deep. The seeds of stone-fruits, such as cherry, peach, etc., should be planted in the Fall, or be so exposed that they will freeze during the Winter. Plant three or four times the diameter of the seed in depth. A light, rich loam, if you have it, is a good soil in which to grow trees. A well-drained soil is necessary. The seed for a nursery ought not to be taken from a grafted fruit, but from a seedling that has arrived at maturity, or to a state of strength and vigor, which is in accordance with the laws of nature; for the progeny of early youth or old age are inferior to the productions of middle age. If apple-seeds could be sown where they are permanently to remain, and there be grafted at the proper time, it would not be necessary to disturb the tap root—an important appendage to convey moisture to the tree in a dry season.

Grafting.—Propagation by grafting is effected by inserting the scion or cutting in, or fixing it firmly on, the stock of a growing tree. If they are joined with an exact eye and a careful hand, so that the inner bark of both will coincide, the sap will flow upward from the tree to the scion without interruption, and the new wood will freely grow downward into the exposed cleft. It is necessary that the fibers and pores of the wood be cut evenly, with a sharp knife, and that after the scion is spliced to the limb, a moderate pressure be applied to hold them together, and a complete plaster of grafting salve afterward added, so as to exclude, completely, the external air and moisture.

Great care should be taken in cutting scions. Scions from an unhealthy stock are much more

liable to affect the healthy tree than we are wont to suppose. They should be cut from healthy trees and from shoots of the last year's growth. We should be careful not to make use of too small and feeble shoots. There have been more failures from selecting too small scions, than from all other sources together. The bark should be glossy, with well-developed buds. The wood should be white and firm, not soft and spongy. Cut them from young and healthy trees, and keep them in a damp place in the cellar till wanted, but do not allow them to be kept wet. In a cold latitude, cleft grafting should not be practiced on trees till the branches are one inch in diameter. The scion, after it is sharpened to a wedge-like point, so as to fit into the cleft, should be left thickest on the outer side, where the inner bark is to join that of the stock. A compound of three parts rosin, three of beeswax, and two of tallow, makes an excellent grafting-wax. A favorite salve is also made by mixing a pint of linseed oil, six pounds of rosin, and a pound of beeswax. It may be applied in any way, so that no interstices remain, and no cracks whereby air and rain may enter.

There are two methods of grafting much practiced: 1, *Whip or tongue grafting*, consisting in splicing the scion to the stock, by joining them on an oblique cut; and, 2, *cleft or wedge grafting*, the insertion of a wedge-shaped cutting in the cleft stock. The first of these methods, particularly adapted to cases where the scion and stock are nearly of equal size, is ex-

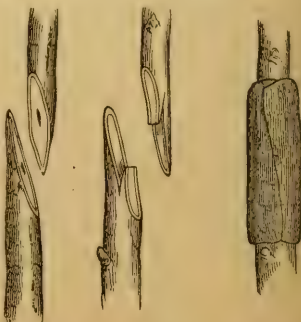


Figure 1.

Figure 2.

Figure 3.

plained by Figures 1, 2, and 3, the first two showing the methods of whip and tongue cutting of the scion and limb, prior to joining them,

and the third a graft completed. Figure 4



Figure 4. Figure 5.

Figure 6.

shows a graft ready cut for insertion into the cleft stock; Figure 5 and Figure 6 represent the two properly joined, ready for the wax.

Grafts put into old limbs will bear much earlier than those put into side shoots. In the former case they partake at once of the qualities of the mature bearing wood.

Scions for grafting, it is said, may be sent safely to almost any distance by mail or express, by dipping the ends in a thick solution of gum arabic, and wrapping them in dry paper or oiled silk. When received they should be packed in dry sand in a box, or moss, or moist sawdust, and buried two feet deep in the earth on the north side of some building. The box should be so inclined as to shed the rain.

The use of grafts or scions taken from young nursery trees that have never borne fruit, or "water-sprouts" from older trees, is a prominent cause of sterility of young orchards, and this opinion is the result of observation and experience. In the Northwest, grafting into the Siberian, Transcendent, and Hislop crabs might prove desirable, and on the northeast side of the tree is thought to have some advantage over the opposite in protection from the sun, and south and west winds.

Grafting is done in Spring, when the buds are swelling, though apple and pear trees will bear grafting even after they are in leaf. THOMAS says: "After a graft is inserted, and as soon as the tree commences growth, the buds on the stock (near the graft) must be rubbed off, in order to throw the rising sap into the scion. The practice of allowing leaves to expand on the stock near the point of union, to 'draw up the sap,' appears to be founded in error," for the sap is expended before it reaches the graft.

Root Grafting is strongly advocated by some, and objected to by others. It consists in cutting off the stock below ground, and inserting

the graft, by whip or tongue grafting, in its place, with its top above the ground. This kind of grafting is largely practiced by nurserymen on one or two year seedling apple trees, and is not practicable on larger trees. The roots are generally taken up in the Fall, and carefully kept in pulverized muck till Spring, the grafting being meantime effected. It is more complicated, and requires more skill than stock grafting, and all who desire to practice it should study THOMAS' Fruit Culturist carefully, or take lessons of an experienced nurseryman.

At the Northern Illinois Horticultural Society, in February, 1868, it was stated that the opposing arguments to the system of root grafting were speedily overwhelmed by the testimony of men of largest Western experience, and Dr. WARDER came down with his usual practical logic in its favor, defining the terms, and saying that careful experiment had demonstrated the sound philosophy of root grafting as a mode of propagation, that success depended less upon the mode of grafting than upon the variety and its habits. The Society adopted the following resolution on this subject: That root grafting is preferable to stock grafting, except with a few varieties.

Budding.—In many localities, the propagation of varieties by budding is surer than by grafting. In the severer climate of the Northwest it is very difficult to get a sound, healthy union between the graft and the stock, and, in these latitudes, this result is easier secured by budding. Fruit can generally be obtained, however, two years sooner by grafting than by budding.

Budding is effected by cutting through the bark across the stock, and, from the middle of this cut, making a short incision lengthwise of the limb—the whole resembling the letter T, as in Figures 1 and 2. "A bud is then cut from

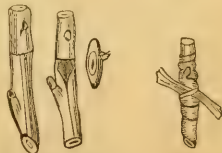


Fig. 1. Fig. 2. Fig. 3.

Fig. 4.

a shoot of the present year's growth by shaving off, the bark an inch or an inch and a half in length," says ELLIOTT in his Western Fruit Book. "A small part of the wood should remain attached directly beneath the bud," as in Figure 3. The edges of the bark, at the incision

in the stock, are then raised a little, as in Figure 2, and the bud put in place, and pushed downward under the bark. A bandage of bass bark, woolen yarn, or other substance is then wrapped around, commencing at the bottom, and, passing the bud, returning again tying just below, covering all but the bud, as represented in Figure 4. The pressure should be just sufficient to keep the inserted portion closely to the stock, but not such as to bruise or crush the bark. In about ten days or two weeks after insertion, examine and see whether the buds have taken, which may be determined by their freshness and plumpness; the strings will then require to be loosened, and, at the expiration of three weeks, removed altogether. The ensuing Spring, as soon as the bud begins to swell strongly, cut off the stock about six inches above the bud; and, as the shoot or bud grows, tie it to the piece of stock above its insertion until about midsummer, when it will be time to cut away the piece of stock above the bud, leaving a sloping cut downward from the top of insertion of the bud. The bud should not be saturated in water, and any leaf connected with it should be immediately cut off to within half an inch of the bud, otherwise the evaporation will exhaust and injure its vitality."

The operation of budding is principally practiced on small trees, and only during the time when the sap flows freely, and the bark peels readily—generally from the first of July to the middle of August. Buds should always be set before the stock has ceased to grow for the season. In setting pears in pear stocks it is important to commence earlier than with apples, as the former do not grow so long as the latter. Plum and cherry stocks also stop growing early, unless the development is kept up by stimulating manure and careful tillage. Apple trees, if healthy and in a good growing condition, may be budded late in August. Peach trees continue to grow even longer than apple trees, and it is never advisable to bud them early. In all trees, when budded, there should be sufficient sap to cause the bark to peel freely.

In budding, the newly-set bud is cemented to the wood of the stock by the cambium, a half-liquid substance between the bark and the wood, which hardens and fastens it firmly. The next Spring the bud grows, forms a shoot, and the two portions become securely united by the new wood. Unless there is enough of the cambium to cement the wood to the stock,

the operation can not succeed; and this is the reason why, with vigorously growing stocks, which are depositing much, budding succeeds better than with feeble growers, where but little of this cement exists.

When apples are grafted or budded on crabs, pears on the wild species, plums upon plums, and peaches upon peaches or almonds, the scion is, in regard to fertility, exactly in the same state as if it had not been grafted at all; while, on the other hand, a great increase of fertility is the result of grafting pears upon quinces, peaches upon plums, apples upon white thorn, and the like.

Cuttings.—Propagation by cuttings is, next to sowing seed, the simplest method of multiplying plants. It consists in setting a shoot of one year's growth in the soil, where, under favorable conditions, the moisture supplies sap, the buds and leaves begin to show themselves, the granulations form a ring of new wood at the lower extremity and roots start out, giving permanent life to the plant. Ordinarily this method is only adaptable to the grape, currant, quince, and the hardier plants that strike root easier. Apple, pear, and peach cuttings will not throw out roots, except when confined under glass. Autumn is the best season to take off scions, and they should be cut off directly below a bud. More than half the shoot should be inserted in the ground. Grapes are propagated by placing the shoots horizontal, with a single bud attached.

Layers.—A layer is a side limb, growing low, bent down at the middle, and covered in moist soil. Some trees and plants which can not easily be increased by cuttings, are propagated in this manner. The sap from the parent trunk sustains the layer while it strikes root, and after these are formed it is severed and transplanted. More immediate success is sometimes attained by splitting upward a small portion of the layer, just under a bud, at the point of its greatest curve.

Dwarf Fruit Trees.—Where a man has but a small quantity of ground he can have more dwarf trees than standard varieties, in a given space, and many regard them as ornamental. Heading, as they do, near the ground, the bodies of dwarf trees are better protected from the extremes of heat and cold than the taller varieties. Dwarf apples receive more attention than they formerly did, and most varieties admit of this mode of cultivation. The apple on the Paradise stock is a

mere bush; on the Doncain stock it makes a little larger growth.

Dwarf trees may be produced in three different ways—by grafting on slow-growing stocks, as the pear on the quince; by planting in pots of small size, filled with poor soil, by which the plant is starved and stunted; and by the Chinese method, of causing a portion of the extremity of a branch covered with a ball of moist clay, to produce roots, and then cutting it off and planting it in a box of poor soil.

In the garden culture of the apple, where trees are retained as dwarfs or espaliers, the more vigorously growing kinds are often rendered unproductive by the excessive though necessary use of the pruning knife; such trees can be made fruitful by digging them up, and replacing them in the same situation—root grafting might answer the purpose. The too great luxuriance of growth is checked, and a disposition to bear is brought on. In one instance, apple and pear-seeds were planted in a box in November, transplanted in the Autumn of the next year; every year the trifling lateral shoots were pruned away, leaving the large lateral shoots at full length to the bottom of the plants—one tree yielded fruit at four years old, and several at five and six. Checking a vigorous growth tends to the early production of fruit.

Thinning Fruit.—Many trees are allowed to bear, in ordinary seasons, from four to six times as much fruit as accords with their full and perfect development. If large and choice well-flavored fruit is wanted of any kind it must be thinned out, removing a few at a time from every part of the tree, so as to leave the residue pretty evenly distributed. The work can not be well performed at once, and it, therefore, should be commenced early in the season, the operator going over his trees, bushes, or vines from time to time, removing now one here, now one there, as the eye meets it, and the evidence appears of the advantage obtained by its removal. Early thinning, before the strength of the tree or vine is taxed in the stoning or seeding, will avail much more than the same course afterward.

Modes of Increasing the Size of Fruit.—Professor DUBRIEUL points out ten ways by which the size of fruit may be increased; and as fruit growers are discovering that fine fruit brings a higher price in the city

markets, these modes are worthy of attention. We condense his rules:

1. By dwarfing.
2. Thinning the branches by pruning.
3. Keeping the bearing shoots short and near to the center of the tree, small specimens growing on the top of shoots.
4. Thinning the fruit.
5. Shortening in.
6. Supporting the fruit on its foot stalk.
7. Diminishing evaporation from the surface.
8. Moistening the surface with coppers.
9. Ringing.
10. Inserting spurs of old trees on vigorous young ones.

Barren Fruit Trees.—"What shall I do with these barren trees, set out fifteen years ago, in a rich prairie soil, their growth going all to wood instead of fruits?" "Take out the hearts," was the reply. So the hearts were taken out—all the interior limbs cut away. The beauty and symmetry of the trees were destroyed. It was done when the sap was in full flow, and the trees just out of blossom. They were, indeed, an unsightly spectacle. The fruit grew and remained on the trees, to the wonder of the owner. It would not thin out by dropping, but bent down their limbs and made the trees look like great spiders, vacant in the center and spreading in every direction. These trees bore the best crop in the orchard. But the crop was so heavy that it made alternate bearers of them. The second year they were again erect, growing rapidly as before, and loaded with blossoming, which ripened into very large crops of fine fruit—a large, perfect yield. These are facts. The trees are yet standing, and are uncommonly strong growers, and will probably go back to their original unfruitfulness, in which case they will need again to be pruned down as before.

Renovating Old Fruit Trees.—Old apple and pear trees frequently become "hide bound." In other language, the bark becomes so hard and dry that the diameter of the body of the tree can not enlarge. This hard and firm bark will not yield, or give way to the expansive force of the sap and new wood scarcely more than if it were tin or sheet iron. As a natural and certain result, the health of the tree is impaired, and the fruit can not grow large, fair, and delicious, as it would be were the bark kept in a healthy condition.

The bark of a healthy growing tree is more or less elastic; and as a new circle of wood is formed, the bark enlarges by expanding, and, in some places, cracking apart. After a few years scales of dead bark cover the body of the tree, which should be scraped off clear to the live bark. Sometimes it may be necessary to shave it off with a drawing-knife. If the tree is very old, and grows but little, we have frequently removed the outside half way through the live bark, afterward smearing the body with a thin coat of liquid grafting-wax, applied warm with a brush. This is essential to the health of old apple as well as pear trees. The bark of peach and plum trees should not be cut beyond the dead bark.

Another thing is, the soil needs renewing. Perhaps for more than forty years a crop of fruit has been produced from that ground where old trees stand, without having received any fertilizing material to compensate for the long succession of crops of fruit. When this is the case, remove six or eight inches in depth of the old soil, with horses and scraper, and haul rich alluvial, or sods from the highway side, in place of what has been removed. Mingle with this earth sawdust and chip manure, the more the better. Let the whole be spaded in deep and thoroughly, with a few bushels of ashes or lime, and some barn-yard manure. In a year or two, if the trees are not too old, and been neglected too long, they will again bear like young trees.

Another economical and effective manner of making old trees bear well, is to enclose each tree in the middle of a small yard, say fifteen or twenty feet square, and keep a few swine in it while fattening. Make holes eight inches deep, with a crow-bar, in scores of places beneath the tree, dropping into each one a few kernels of grain. The swine will shortly root up every inch of ground, destroy all the roots of weeds and grass, and renovate the soil with the fecal matter which they deposit, so that another season the trees will bear abundantly. This has been tried with the best results, on old pear and old cherry trees. Autumn is the best time to attend to it.

Girdling fruit trees to produce fruit has been tried successfully. Captain JOSEPH DAVIS, of Templeton, Massachusetts, noticed that an apple tree of his, which had not previously borne, had a small portion of the bark accidentally torn from its trunk, while in blossom, and produced quite a quantity of fine apples that year. The next year he experimented on

a barren fruit tree, girdling only one of the largest branches, cutting away the entire bark about half an inch wide, taking care not to cut the wood; and the result was this limb produced a large quantity of fine apples, while the rest of the tree yielded none. Similar experiments on a large scale produced the same results.

Hon. JOHN Y. SMITH, of Wisconsin, says: "Hearing that the bark might be stripped from a fruit tree, any time in July, without injury, and having an apple tree that shed its fruit about the middle of July, we girdled two limbs, cutting a ring out entirely around about three-fourths of an inch wide. The fruit had mostly dropped off at the time, and the cause seemed to be the apple worm, so that no very marked effect upon the fruit was expected. Still, the fruit on those limbs hung on better than on the rest of the tree. It did not injure the limbs at all. A new, thin bark soon formed, not apparently by any inductive process from the bark on either side of the girdle, but as if the material oozed from the naked wood." Barren trees are sometimes made productive by July pruning and by cutting the roots at the tip ends.

Bruising fruit trees in their blossoming season, will produce the same results. In our school-boy days, there stood upon the common near the school-house, a large black-walnut tree, which had never been known to bear fruit. A boyish freak induced a score or two of youths to pelt the tree unmercifully one Spring with good sized cobble-stones as a punishment for its barrenness; and to the surprise of all, that year at least, it produced a plentiful crop.

Fertilization of the earth at the proper time and in proper measure, is, however, generally better than any thing else. Sap in plenty is to fruit trees what blood is to animals. Its vigorous flow reaches every part and gives to each its proper play and function. There are frequent instances of a decrepid, shriveled branch, which, by the throwing open and manuring of the roots, and a thorough pruning of the whole top, increases from an inch to two inches in diameter in a single season; and without assistance as it grows, bursting and throwing off its old contracted bark as freely as the growth of a vigorous asparagus shoot would develop itself during a warm shower in May.

Manuring Orchards.—Nothing pays better for care and attention than fruit. A

single acre kept in good heart by manuring and cultivation, will yield more profit than ten acres neglected in the ordinary way. The only secret in having apples abundant every year, is in keeping the trees clean and feeding them. Leached ashes make a good manure.

Orchards, says the *American Farmer*, to ensure continued fruitfulness and fair fruit, should be periodically manured, in order that the food carried off annually in the fruit, should be restored to the soil. Six parts peat and two of lime, or six parts marsh mud and two of marl, would form an excellent dressing, in the proportion of twenty loads to the acre; the cost of which might be covered by growing a crop of corn, potatoes, or other roots thereon, the year of any such application. But see to it that the thing be not overdone, and an excessive vegetable growth produced.

Digging About Trees.—Few trees, comparatively, have any roots to part with. For this reason the fork should be employed, instead of the spade, for pulverizing the ground where there are roots, as the spade will cut off all the small rootlets, to the injury of the growth of the tree. The tines of a fork will crowd them aside, seldom breaking even the small ones. Then, as the hard soil is broken up with fork-tines, and removed from the roots and returned to them thoroughly pulverized, all the little fibers are brought in contact with different portions of soil that has not been exhausted of its fertility. Thus, comparatively new earth settles around the roots, so that in a short time the spongioles begin to absorb plant-food, and thus promote the growth of the branches and the fruit. Now, if a spade be used, such a large proportion of the roots will be severed that the sources of plant-food are all cut off, except a small proportion of the rootlets beneath the large roots, far down in the soil, beneath the reach of the spade, where they can absorb only a limited supply of nourishment. Great care should be exercised, whether the soil is pulverized with fork or spade, to mutilate the roots as little as possible.

Management of Forked Trees.—

There is always danger of forked fruit trees splitting down by high winds or a heavy yield of fruit. We have seen in Illinois, and other Western States, a very simple and effective remedy. Let twigs or small limbs grow out on the inside of each prong, say six or eight inches or more, above the fork, and when they

are long enough to reach across the space, twist them together—in some cases tying may be necessary to keep them firmly attached—and a second set of sprigs, similarly twisted, a little distance above the others, and the ligament will soon grow firmly together, and enlarge from year to year, rendering it impossible for the tree to split at the fork.

Coreless and Seedless Fruits.—As

early as 1838, the senior editor of this work learned from his friend, S. S. ABBOTT, then of Alexander, Genesee county New York, that when a youth, attending a country school in central New York, he, in conjunction with his school-fellows, in a freak one day, tore up by the roots a barren apple tree near the school-house and replanted it firmly in the ground invertedly—the roots uppermost. Contrary to all expectation, the tree survived, re-rooted, sent forth a new top, and in due time yielded a fine harvest of fruit—all delicious apples, but without core or seed, and such was the character of the fruit ever after. This singular freak of nature was mentioned to the late PAUL HAWES, of Sylvania, Ohio, a man of close observation, who said that he had often experimented in raising fruit without cores or seeds, and always with success. He said that he would generally bend down some low limb of a tree, so as to insert its top in the earth, and when it had taken root, would sunder it from the parent tree, transplant it. At sufficient age, it would produce coreless and seedless fruit; sometimes, not often, he added, there would be a slight indication of a core observable, but never of the seed.

We have seen and eaten apples, says JOHN Y. SMITH, editor *Wisconsin Farmer*, as destitute of seed or core as the soundest potato; and we were told that they were produced by inverting the tree.

To make peaches grow without stones, an agriculturist, who has tried it with success, says: Turn the top of the tree down, cut off the ends, stick them into the ground, and fasten so with stakes; in a year or two those tops will take root, and when well rooted, cut the branches connecting these reversed and rooted branches with the tree proper, and this reversed peach tree will produce fine peaches without stones. The same experiment may be tried with plums, cherries, currants, and grapes. How much better these fruits would be for eating, drying and cooking; and seedless grapes would give us seedless raisins.

The best oranges in the market at Bahia, Brazil, are superior flavored and seedless—doubtless produced in this way. When we call to mind the increased richness and delicacy of animal food—the capon, for instance, when deprived of the power of reproduction, may we not have sufficient grounds to hope and expect that the flavor of fruit would be much improved by the process here indicated?

Ornamental Fruit Plantations.

One of the subjects that commends itself to the practical horticulturist who finds it necessary to make the beautiful subserve the good, is the arrangement of his orchards and other fruit plantations so as to at once please the eye and at the same time admit of facility of cultivation and the proper production of fruits. Mr. SAUNDERS, of the Experimental Gardens, at Washington, says he has long endeavored to show how fruit trees may be arranged to take the place of purely ornamental trees in pleasure grounds. In grouping the trees, he would make the outline of the groups irregular, while the trees may be placed in a formal manner in the interior of such groups, each group may contain a certain class, or variety of class. Occupying the center of such groups, upright growing kinds, such as the Buffum, among pears, and the Lady apple, among apples, may be planted in the extreme outlines, set with pendant varieties. Avenues (straight) planted with the cherries will be suitable. Dwarf apples and pears will make a fine, effective outline, surrounding the larger tree. Winter apples in one group, Summer apples in another, Winter pears in a third, etc. For shrubbery, currants and gooseberries answer. Raspberries should be placed in an arrangement by themselves. These and strawberries can not be made to produce much effect in landscape.

Many of the fruit trees are of beautiful habit of growth, as fine as any other deciduous trees, but the mode of planting an orchard would make any tree look commonplace. An acre of Norway spruce or Sugar maple planted twenty-five feet apart would look as formal as any apple orchard.

Picking and Preserving Apples and Pears.

—We copy the following, on this branch of the subject, from the *Rural World*: "Most people let apples and pears become too ripe before they gather them. They wish to see them fully ripe—ready to fall off the tree before they pick them. This is wrong.

If picked a few days before maturity they will keep longer, color more highly, and command a better price in market. The precise time to pick is rather difficult to determine. The best criterion is to raise the fruit up and bend the stem over, and if the stem parts from the shoot without breaking, the fruit is ready to pick—whether apples or pears. Pears should be picked earlier than apples. The quality of the fruit is also improved by early gathering. After being picked it should be put in tight boxes or barrels, and kept a few days in the dark, if of Summer or Fall varieties. Here they undergo a sweating process, and when the box or barrel is opened, the fruit will be found of the brightest crimson and richest golden colors. Half of the secret of success in orcharding, is in knowing how and when to pick fruit, and how to get it to market so as to command the highest price and readiest sales. Every one's experience must govern him, and the more he studies this matter, the more expert he will become."

Summer apples, and especially those inclined to *mealiness*, should be picked early—as soon as the skin begins to change color, otherwise they part with their juices, and become worthless. Ripeness is indicated by the seeds turning dark colored, and by the stem parting readily from the tree when it is lifted upward.

Winter apples and pears should be allowed to remain on the trees as long as vegetation is active, or until frosts are apprehended.

The *Maine Farmer*, on the other hand, wishes to disabuse the public mind in regard to the sweating of apples. "We do not believe," it says, "in anything of the kind. We have not seen it on our own apples for twelve years past, simply because we have put them into the cellar at the close of a warm day in October, when the apples were warmer than the cellar. Put them in the cellar in November, when the apples are colder than the cellar, and they will condense the warmer moisture of the room upon them, and this is all the sweating they ever have. If you doubt it, try two barrels, one in a warm day in October, and the other on a cold day in November, and you will be convinced."

With reference to the mode of gathering the fruit, some do so with a step-ladder, or a light narrow ladder, and a sort of sling sack thrown over the left shoulder, with the mouth in front, picking the fruit carefully with the right hand and placing it in the sack, with as much tenderness as they would so many eggs. All fruit

should be emptied with great care to keep well. The baskets into which fruit is deposited from the sacks should be broad and shallow, with paper, cloths, or moss placed in the bottom to prevent bruises, and also between layers. Fruit should only be gathered in dry weather, and in the dry time of the day.

A cheap and simple fruit-gatherer has been brought to the notice of the public, by N. G. CARNES, of Riverdale, New York. It is simply a narrow sheet of strong tin, bent to a circle, and the ends tacked to the end of a pole. The upper edge is cut with notches to pick the fruit, and a bag large enough to hold half a dozen or more fair-sized apples, is attached to the lower edge. The engraving represents the handle inserted in a tin tube, which is soldered to the side of the apparatus, but this is not necessary. Any one can fit up this arrangement with a piece of old tin leader, a small strip of muslin, and a pole, at an expense of not over six cents, and it will



be as effective as many implements of the sort costing ten or twenty times the amount. The teeth or scalloped edges should be rounded and filed smooth, to prevent their cutting the apples, pears, and peaches in careless handling.

It is speaking within bounds to say that one-half of all the Winter fruit put up for market or for family use is spoiled in gathering, and in careless handling after it is gathered—few realizing the mischief a bruised apple will cause to those that come in contact with it in bin or barrel.

In barreling apples, some advise putting a little sprinkling of dry hay or oat straw between the layers, but we doubt whether the hard substances likely to get in would not, on the whole, do more harm than would be balanced by the isolation of the fruit, unless enough were put in to make it objectionable on account of the filling up. Something of the kind should be put in the bottom of the barrel to relieve the pressure against the wood, the barrel be filled nearly even with the head, and the fruit shaken down gently and a little packing be put over the top so that the head will press snugly upon it, to keep the fruit from shucking about when moved. Vent holes should

be bored in both heads of the barrel before the fruit is put in.

In packing for long transportation, the approved method is to press the apples down by a press constructed for the purpose, so that in handling there is no moving about of the fruit in the barrel. In this practice care is exercised not to apply so much pressure as to crush the fruit, but apply sufficient to pack it firmly together. But the fruit properly gathered and packed, all its subsequent handling should be with the delicacy with which we handle eggs. Care in these respects is all that is necessary to make the fruit business much more reliable than it is at present, and much more profitable both to seller and buyer.

There are many opinions as to keeping fruit; people generally ignoring the fact that the best method in one locality will by no means be the best in another—this depending on the temperature and dryness of the place, and the kind of fruit. In cool dry cellars apples are usually kept best on large shelves—the Rhode Island Greening and Northern Spy preserving their texture and flavor a long time in this way. Some kinds of Pippins also keep very well on shelves; while those that, like the Holland Pippin, sometimes have more or less black spots on the skin, will keep better on shelves than in barrels—as when barreled up the black spots on these apples will soon mold and rot. Air, and freedom from too much moisture, are what apples most require.

Records are daily made, and have been for years, of the success of keeping apples after being frozen solid, and hundreds of barrels are yearly buried in the earth and brought out in Spring as fresh as so many potatoes. The one great condition of the preservation of a frozen apple is that it be kept in the dark until completely thawed out. And the condition of keeping apples in ordinary dry cellars, is to place them in bins, or boxes, of about one foot in depth, and cover them from all light, while at the same time there is kept up a free circulation of air in the apartment. Light and warmth serve to assist the natural process of maturation, while shade and a cool temperature retard it. Shade; again, in a confined atmosphere, as in the case of apples barreled tight, often advances decay rather than retard it.

At a recent New York State Fair, DELOS RUNDALL had on exhibition some Russet apples grown a year before. They were plump, fresh, and of good flavor, quite as good as the

same kind of apples ordinarily are on the approach of Spring. They were put up in refuse boxes obtained at the groceries, and in the following manner: A layer of dry sawdust was sprinkled at the bottom of the box, and then a layer of apples placed in it so that they did not touch each other. Upon these were placed a layer of sawdust, and so on until the box was filled. The boxes, after being packed in this way, were placed on the wall of the cellar, up from the ground, where they kept, perfectly retaining their freshness and flavor, until brought out and exhibited at the fair. He says he has kept apples in this way some months later than those here mentioned.

Another excellent plan for late keeping is, to wrap up each apple in a bit of old paper and pack them in barrels or boxes. Old newspapers torn into patches eight or ten inches square, will answer. However packed, all wormy or otherwise defective apples should be culled out. Store apples, in Fall and Winter, should be kept in a dry place, and as cool as is consistent with safety from frosts.

To those who have not a good dry cellar, the following plan, suggested by a Missouri correspondent of the *Prairie Farmer*, will probably answer as a substitute, increasing the amount of covering in colder latitudes: Select a dry spot near the dwelling—dig a trench to the depth of half the length of a barrel, and a little wider; cover the bottom with a sprinkling of cornstalks; set the barrels filled with apples on this bedding and put stalks between the barrels and the sides of the trench; cover well with hay or straw and over this a coating of earth three or four inches thick. Make a roof of two wide planks, edges nailed together. When Winter sets in put a few inches of dirt over the roof. When a barrel of apples is wanted take it from under the roofing and close the pit tightly again till all are removed.

Drying Fruit.—Dried apples and peaches constitute a considerable article of commerce. But their quality is immeasurably inferior to that which might be attained. The same difference in flavor exists between unpalatable seedlings and the most highly improved grafted variety, whether they be fresh or dried. Yet the poorest apples are usually selected, simply because the dried fruit is bought by the pound and not for its excellence. Late or inferior peaches are chosen, because their owners have no other use for them; when besides the inferior flavor of the late seedling so largely

used, the cool damp weather to which they are exposed while drying, does the work in a very imperfect manner, and a half-decayed flavor is often mingled with that of the fruit itself. If dried at all in the open air, it is of much consequence that early sorts, both of apple and peach, be selected, that the benefit of a hot sun may be secured. Why is it not as easy to plant and raise early prolific sorts, that will ripen at a time when two days of hot sun will dry them, as later sorts, which will scarcely get dry at all in the open air?

The want of a free circulation of heated air is the reason why the use of flat boards and shelves is usually attended with greater or less decay. Light wooden lattice work is better, but imperfectly admits a free circulation, without making the slits too wide to prevent the dried fruit from falling through. Cheap netting or light twine is a still farther improvement. Frames covered with coarse gauze or netting would probably be found well adapted for drying the smaller fruits. If dried in a drying room, with artificial heat, upon netting shelves, stretched on frames, one above another, still there must be a current of atmosphere to sweep off the moisture from the fruit.

Apples should be dried in clear, dry weather, and never exposed to wet, or the night air. Such exposure turns them a dark color, which not only lessens the market value of the article when offered for sale, but renders them less desirable for culinary uses. After exposure for some days to the air and sun, remove to a light airy chamber, and there perfect the process, keeping open the doors and windows while the sun is above the horizon, but securely closed while below. Dried apples, manufactured in this way, will be found greatly superior to the same article made in the ordinary careless manner. Only sound and perfect fruit should be selected for this use.

Influence of Strawberry Plants on Trees.—On this subject, we have the following from the *Country Gentleman*: "There are few, if any, cultivated plants so pernicious to fruit trees and berry bushes as the strawberry when it is planted around or near to them. They not only feed largely upon the mineral, vegetable, and electrical ingredients of the earth, but also partake of the life-producing qualities which surround them in the atmosphere. While the strawberry looks thrifty and vivacious, the other fruits it has encompassed appear wan and sickly, notwithstanding that the soil they stand

upon may be fertile. You must not expect large, rich fruits to grow within its surroundings, for the natural reason that the strawberry plant holds a stronger affinity in attracting the gases and electrical currents from the vivifying atmosphere, and the more crude and unmel-
lowed absorbents from the earth."

Fruit Growing in the South.—

At a recent Pomological Convention, held in New York city, Mr. REDMOND, of Georgia, set forth the superiority of the climate of the Southern States for the production of nearly all the finer varieties of cultivated fruits. He remarked that a great misapprehension had long existed in regard to Winter Apples at the South, it having been supposed that long-keeping varieties could not be raised there. This is a mistaken notion. If Southern seedling varieties are selected, there is no difficulty in producing, throughout the Southern States, apples superior in size and flavor, and fully equal in keeping qualities to the very best of the North or Europe. He also spoke of the success of the Pear at the South, and expressed the opinion that it would there attain its highest development and perfection. The Peach finds its true home in the South, and has long been the favorite fruit of the people. It has been found a very profitable fruit for shipment to the North, and large orchards are cultivated on the railroads leading to Savannah, Charleston, and Norfolk, for the supply of the New York market. A constant succession of Peaches may be had in the South from early June until the first week in November. The Nectarine and Plum also succeed well; but the Apricot is liable to be cut off by the Spring frosts. The Quince is not grown to any considerable extent, but succeeds well in some localities. The Cherry, as a general rule, does not succeed well in the far South; the common Morello does better than the finer varieties. The Currant and Gooseberry can not be profitably cultivated at the South; neither, as a general thing, can the improved varieties of Raspberry. The Strawberry succeeds perfectly, producing fruit for three or four months in succession, when regularly watered. The Jujube and the Olive are beautiful and valuable fruits, and worthy of a place in every garden in the South—as is also the Pomegranate, which grows very freely and hardly ever fails of a crop. Of all fruits cultivated at the South, the Fig requires the least care, and is one of the most useful and productive. It comes into bearing early, pro-

duces two or three crops a year; and if dried for exportation or preserved in sugar, might be made a crop of great importance to the South. The Grape is beginning to attract great and deserved attention at the South. It grows there with a luxuriance, and produces such an abundance as is seen in no other portion of the Union. Large vineyards are being planted; new varieties introduced; vine-growing associations and companies formed, etc. Many vineyards are now in successful bearing, and the wine already produced has been pronounced very superior by all connoisseurs who have tested it. The vine succeeds perfectly on poor lands and hill-sides unfit for ordinary planting purposes; and the raising of Grapes for market and wine-making is destined very soon to become of the very greatest importance to the whole South.

The fact has come under our observation, says the *Wisconsin Farmer*, that in the South, as far as central Alabama, and we know not how much farther, the peach trees are liable to failure, and that they begin to die just as our apple trees do here—on the southwest side—and to prevent this, they set up a board on that side, close to the trunk, extending up to the branches.

It appears from a paper read before the Pennsylvania Horticultural Society, by Dr. P. J. BERCKMANS, of Augusta, Georgia, that apple trees fail there just as they do in Wisconsin. Death commences in the trunk on the southwest side, and extends to the top and around the whole tree till it is destroyed, and that they seek to avoid the difficulty just as we do here, by growing the tops close to the ground. It appears also that the Winter varieties of the Eastern States are worthless there, and that they are obliged to seek out new varieties which will stand the heat of that climate, just as we are obliged to look out for varieties which will stand the peculiarities of our Northwestern climate. Whether the killing of fruit trees in the South and in the Northwest is from the same extreme—heat and dry winds—or from opposite extremes in the two localities, we regard as still a subject for study. Certain it is that trees which die in Georgia and Alabama precisely in the same way that they do in Wisconsin, do not freeze to death in Winter in those localities; while it is not equally certain that in this locality they do not burn to death in the Summer. Extremes of heat and extremes of cold, however, often produce very similar effects. Without further comment, we copy the remarks of Dr. BERCKMANS, on apples in the South:

"*The Apple*.—This being the most reliable in its products, must rank as our first fruit in cultivation. For years past the prevailing opinion throughout the South has been that this fruit will not succeed well enough to be depended upon as a profitable crop. Happily, this prejudice is losing ground, and more attention is being paid to the cultivation of this fruit. The main failures are owing to the selection of varieties unsuited to the climate, and the training of trees as high-bodied standards. The Northern and European Summer apples generally improve in quality here, but few late Fall apples of the North are worthy of cultivation; and, so far, I know no true Northern Winter apple that is of any value for us. The latter drop their fruit in August, before they are perfected; and, as a whole, are unfit for any purpose whatever. The want of Southern Winter apples, long felt, is now amply supplied. Thanks to the efforts of our Southern pomologists, we have now a class of fruits which are bringing the culture of the apple on a large scale a profitable feature here. As to the quality of these Winter apples, numbers are of the very best description, and we have scores of varieties that will keep until April or May in the middle sections of the States of Georgia, Alabama, South Carolina, and Mississippi.

"The training of the apple trees has been heretofore very defective. Having few works treating upon Southern pomology, the public have been dependent on the writings and teachings of the Northern pomologists; and although no work has its equal in the world to 'Downing's Fruits and Fruit Trees,' it will not do to follow it *verbatim* in every section of the country.

"We require *shade*, in the Eastern States *sun* is necessary to perfect fruit; hence our aim is to train our trees with low bodies, making the foliage of the tree shade its roots, and endeavoring to make the heads as compact as possible, and produce the fruit as near its center as can be feasible. Hence, high, naked-bodied trees are short-lived—the bark is diseased on the southwest side, the heads are likewise deficient there, and, after a few years, the tree decays and dies.

"The apple tree begins to bear much sooner than farther north. Some varieties, like the Shockley, will produce remunerative crops the third year after transplanting. Others require more age; but as a rule, an orchard begins to bear well the fourth year of planting. We require young trees to start with—one-year-old

apple trees cut back to two feet, are the most preferable. The apple grows with such vigor that one-year-old nursery trees often attain ten feet growth upon ordinary upland."

We find in the *Southern Field and Fireside* the following statement by Dr. BERCKMANS, pertaining to pear culture in the South: "The Bartlett is decidedly better here than in New York or Pennsylvania; the White Doyenne is more hardy, more certain, but rather too rich; the Flemish Beauty, the Pratt, the Buffum, the Van Assche, are larger and better here than in the North. So with nearly all the pears I had occasion to test in Georgia and South Carolina, except the old Winter pears. Varieties of doubtful quality in the North, as the Parfum Aout, Fondante de Septembre, Bellissime D'Ete, Belle de Bruxelles, which I found to be of uncertain or second quality in Boston, New York, and New Jersey, are almost of first quality in my grounds in upper Georgia, a paradise for this favorite fruit. So much for the influence of a Southern temperature upon the pear. And, as for the much-dreaded action of the Southern sun upon the bark, let me remark that I found it not to be so prejudicial as it is commonly thought to be. I have planted all sorts of trees, and some with highly denuded bodies; I have not found any of them to suffer from that cause. The only pernicious effects in such cases is owing to the rash process of suddenly removing the protecting limbs from a fruit tree, when the body has not been exposed and inured from its early youth to the South-western rays of the sun."

If an apple was the forbidden fruit of Paradise, it was the falling of an apple that led Sir ISAAC NEWTON to discover the law of gravitation. The apple, says DOWNING, is the world-renowned fruit of temperate climates. It is "the king of fruits," and "belts the year." Out of a thousand varieties, less than fifty will be found eminently profitable. We shall aim to notice only the tried and reliable few, leaving the curiosity hunters to indulge their love for novelties.

APPLES—SUMMER VARIETIES.

Benoni.—Said to be the prince of early apples for the Ohio Valley; the limbs have an upright habit, fruit is good and rich, ripening in July, and the tree is healthy and a good bearer. Succeeds finely on the Western prairies, and in the South.

Carolina Red June.—Much cultivated in the South, where it ripens in June; in Illinois, Iowa, and southern Wisconsin it has proved hardy and a profuse bearer, and ripens in July and August; fruit medium size, deep shining red and white, tender and pleasant. About two weeks later than the Red Astrachan.

Dutchess of Oldenburg.—This is of Russian origin, and one of the very hardiest for the Northwest, standing the Winters as far North as St. Paul; fruit medium to large, light red and striped, sharp subacid. Season, August and September.

Early Harvest.—A pale yellow fruit, one of the very best early apples for all purposes except keeping; not, however, a prolific bearer. July and August.

Early Joe.—Hardy, a good bearer when well grown; fruit of a delicate pear flavor. Last of August. Dr. JOSEPH HOBBS, of Wisconsin, recommends the Early Harvest and Early Joe, tested by him, as suited for general culture in the Northwest.

Early Pennock.—A thrifty, hardy tree, and an early and prolific bearer, of not more than second rate quality; fruit greenish yellow, juicy, subacid. August.

Early Strawberry.—Sometimes called the American Red Juneating; tree erect, productive; fruit rather small, yellowish white, subacid, tender, and generally esteemed. July.

Fourth of July.—From Columbus, Ohio, not identical with the Tetofsky, but resembling it in beauty of growth and hardness of tree, but fruit of better quality—worthy of general cultivation, especially in the Northwest, where orchards are liable to winter-kill. July.

Garden Royal.—A slender, slow growing tree while young, hardy, annually productive; suited to gardens, or small orchards when a delicious fruit is desired for family use; fruit rather below medium size, tender, mild subacid. August and September.

Golden Sweet.—Tree hardy, irregular grower while young, spreading top, very productive and profitable; fruit medium size, yellow or green, a rich, agreeable sweet taste, excellent for baking. Late Summer and early Fall.

High Top Sweet.—Or Sweet Lowell, or Summer Sweet, or Sweet June—tree hardy, upright, productive; fruit medium, greenish yellow, juicy, sweet, and good. August. Very popular West and Southwest; is being introduced into the Northwest.

Red Astrachan.—One of the few universally recommended for the Northwest; a hardy Rus-

sian variety, good bearer, rather acid, and a fine cooking and marketing variety. August.

Saps of Wine.—A hardy fine growing tree; fruit medium size, light red, juicy, mild, subacid, good. August to September. It has succeeded well in the Northwest, and is excellent and popular everywhere.

Sweet Bough.—Tree rather tender, a moderate annual bearer, succeeding on good soils not wet; fruit hardy, medium size, greenish to pale yellow, crisp and sweet, desirable as a dessert fruit.

White Juneating.—Tree upright, moderately productive, will bear close planting; fruit small, but very early, pale green, tender, juicy, subacid. Last of June and early July.

Williams' Favorite.—Hardy, and good bearer; fruit medium size, mostly red, tender, and very good. August.

Tetofsky.—This is one of the hardy Russian varieties, a regular annual bearer, similar to but earlier than than the Red Astrachan; fruit medium size, subacid, aromatic. Last of July.

AUTUMN VARIETIES.

Autumn Strawberry.—Hardy, upright, vigorous and productive; fruit medium, oval, striped, juicy, and good. October.

Bailey Sweet.—Tree hardy, fruit large, yellowish red, rather dry, otherwise rich and good. November to December.

Bevan.—Hardy, vigorous, spreading; fruit medium size, striped on yellow, spicy, rich, high flavored. September.

Borovitsky.—Another of the hardy Russian varieties, suited to the Northwest; fruit roundish, pale green, translucent, sunnyside faintly striped, firm, juicy, and agreeable, subacid. August to September.

Cooper's Early White.—Grown in Illinois and Wisconsin, where it is regarded as productive and profitable; fruit medium size, roundish, pale yellow, flesh white, crisp, and sprightly. Needs a soil supplied with potash. September and October.

Drap D'Or, or Cloth of Gold.—Hardy and vigorous; good annual bearer, excellent market variety; subacid, juicy, and well flavored; succeeds well in northern Illinois and southern Wisconsin. September and October.

Emperor Alexander.—Of Russian origin, hardy; fruit a beautiful deep red, tree spreading, vigorous, and productive. October and November. A northern Iowa farmer strongly

, recommends, from his own experience, the Russian varieties, Borovitsky, Dutchess of Oldenburgh, Emperor Alexander, Red Astrachan, and Tetofsky, as succeeding well fully as far North as the forty-fourth degree of latitude by giving winter mulching to protect the roots; and were he to plant another orchard, he would plant one half his ground with them. They are all, he adds, vigorous growers and early bearers.

Fallwater, or Tulpehocken.—From Pennsylvania; large and popular, second rate; tree stout, vigorous, and spreading; produces well on limestone soil, and fruit having a thick skin, keeps well even in Southern latitudes.

Fall Orange.—Tree a fine hardy grower, bearing very young; fruit light greenish yellow; large, subacid, and first rate when well ripened and fresh from the tree.

Fall Pippin.—Tree tender, but survives the Winters of northern Illinois, southern Iowa, and southern Wisconsin, it is a coarse grower, and requires wide planting; bears moderately while young; fruit large, greenish yellow, splendid. Grown extensively in the Eastern and Western States. October to December.

Fall Queen, or Horse Apple.—Hardy, and an early and productive bearer; fruit large, yellow and striped, mild subacid flavor; much grown and much esteemed in the South and Southwest, and adapted to the Northwest. September.

Fall Stripe.—Vigorous grower, early and productive bearer; extra hardy for the Northwest; fruit, medium size, round, aromatic, subacid. August and September.

Fall Wine, or Sweet Wine.—Tree slender, slow growth, healthy, producing annually, but moderately; much grown in Indiana and Illinois as the Wine apple; fruit medium to large, rich red, marbled over clear yellow, with spots, juicy, subacid, delicious. September to November.

Fall Winesap.—Generally very hardy; fruit medium size, round, conical, pale green, with blush; juicy, vinous, good, and a great favorite. October to January.

Gravenstein.—Succeeds well on all soils, annually productive; fruit large and handsome, changing from pale green to rich yellow; tender rather sour, good, with a peculiar aromatic taste. September and October.

Haas of Northern Illinois.—This is a very hardy apple, different from the Haas of southern Illinois, and it differs too from the Fall Queen, with which it has been confounded.

From its success where tried in Wisconsin, it bids fair to prove a valuable variety for the Northwest.

Keswick Codlin.—Hardy, bears early and profusely, and is valuable for cooking; suited to Western soils and the Northwest generally; fruit above medium size, greenish yellow, tender, and acid. September and October.

Lowell, or Greasy Pippin.—Hardy, good, and early bearer; has succeeded well in Ohio and northern Illinois, and is there commended for extensive cultivation for dessert, cooking and market purposes; fruit large, productive, and profitable; green, turning to rich yellow, oily surface, rather coarse, subacid, and fine aroma. September.

Maiden's Blush.—Rapid grower, best adapted to limestone clay soil; very productive and profitable; fruit clear lemon yellow, with cheek varying from faint blush to rich crimson; tender, rather sharp subacid unless fully ripened; valuable for cooking, drying, and very salable on account of its beauty. Rather tender for the Northwest. September and October.

Meyer's, or Ohio Nonpareil.—Straight, stout growth, compact head; an annual bearer of large, handsome, and good fruit, red and yellow, marbled and splashed color. "In our experience," says ELLIOTT, "it is one of the most valuable of Fall apples." October to December.

Plumb's Cider.—Hardy, vigorous and productive; succeeds well in the Northwest; fruit large, oval, red striped, subacid, good for cider, pies, and family use.

Porter, or Golden Pippin of Michigan.—Has proved a hardy and full bearer of good fruit in Iowa and northern Illinois, and one of the best at the South; fruit medium to large bright yellow, with blush cheek when exposed to the sun, juicy, tender, acid. September and October.

Primate.—Popular in central New York, and esteemed where known; fruit medium size, roundish, very tender, delicate, mild subacid, and of best quality. September and October.

Rambo, or Seek-No-Further, of Pennsylvania. Succeeds best on limestone soils, in Middle States and Ohio Valley, superior as a Fall apple; rather small, yellowish white, crisp and juicy, well adapted for the table. October to February.

St. Lawrence.—Hardy, vigorous and productive, of Canadian origin; has succeeded well in northern Iowa, where it appears, in that cold climate, to have improved in the vinous and sparkling subacid qualities of its large, beau-

tiful, yellow striped crimson, juicy fruit. September and October.

Smokehouse.—A free grower, bearing early and abundantly; well, approved in Pennsylvania, Ohio, and East; red, striped, and mottled color on greenish yellow; crisp, juicy, delicate, agreeable aroma. October and November.

WINTER VARIETIES.

In a report and a discussion on apples, at the Ohio Pomological Society, in 1865, it was stated that many of the most experienced fruit growers are of opinion, that in Ohio they should look to the South instead of the North and East for trees of the best and longest keeping varieties. The philosophy of this was claimed to be that the Northern and Eastern kinds transplanted to the Ohio Valley ripen too soon, and after maturation begin to lose their solidity and keeping qualities; while those from the South are looking for a longer Summer, and when gathering season arrives, it finds them solid and green, and they will only fully ripen the next Spring, when the warmth again appears to inaugurate maturation.

American Golden Russet, or Bullock's Pippin. Medium size, erect, slender tree, admirably suited to the rich soils of Ohio, Indiana, and the Southwest. The fruit is russeted in the South; in the North, on sandy soil, it is of a rich, green, yellow color, with russet marblings; fruit small to medium, juicy, almost buttery, delicate and sprightly—in quality first rate; beautiful in appearance. The best of the Russet family; not profitable for general cultivation. December to February.

Baldwin.—Takes the lead of all other apples at the East, surpassing all others for early, great and continued bearing; needs a limy and potash soil, and has generally proved too tender in Western prairie soils, but succeeding better on hilly and sandy locations; and in Southern States the fruit drops prematurely; fruit large, yellowish, striped and dotted, tender and subacid. Better at the North than South; in the West it is liable to the bitter rot. Early Winter.

Ben Davis, or Red Pippin.—This variety is from Kentucky, and is a favorite in the South; is proving hardy in the Northwest, a prodigious grower, and a constant and abundant bearer; fruit large, somewhat egg-shaped, striped and splashed with red and yellow;

mild, subacid, pleasant flavor. Winter and Spring.

Bailey Sweet.—Grown successfully in the Ohio Valley and northern Illinois; fruit clear yellowish red, round, beautiful, delicate, sweet, juicy, rich. November and December.

Bellflower, White. Called also Detroit, Ohio Favorite, and Ortley; succeeds well, and is one of the best of apples in southern Ohio and Indiana, but has bitter rot south of the Ohio; does best in the West on new ground; fruit yellowish white, fine for table use, from December to April.

Bellflower, Yellow.—Adapted to the Ohio Valley; has beautiful blossoms, is a superior variety, but moderate bearer; a coarse grower, and needs wide planting; fruit pale yellow, with blush next the sun—fine table fruit. October to March.

Belmont, or Golden Pippin.—A healthy, vigorous, spreading tree, a good bearer; succeeds well in Pennsylvania, Virginia, Ohio, and Indiana; loses its flavor in the South; does not do well on rich alluvial soils; but on all high, warm, or limestone soils does finely; fruit, a rich, light yellow color, fine grained, juicy, subacid. November to February.

Bond's Red Winter.—Has proved very hardy in the Northwest; fruit medium size, roundish, slightly ribbed, with most of the surface covered with brilliant red; tender, with a good and agreeable subacid flavor. During Winter.

Blue Pearmain.—Hardy, succeeds well in the Ohio Valley; tree very large, not a good bearer; fruit striped and blotched, mild subacid, good. September to January.

Broadwell, or Broadwell Sweet.—Popular in southern Ohio; tree vigorous and spreading, very productive; fruit medium to large, light yellow color, with cloudy flakes, fine grained, sweet and juicy. November to March.

Canada Black.—Tree hardy, upright, and a strong grower; fruit medium to large, oval, green, mostly covered with dark red; juicy and mild. February to Spring. Evidently very similar to the Black Detroit.

Dominie.—This is the Wells apple of Ohio; hardy, strong, and vigorous, a good bearer, and a profitable orchard variety for the West; fruit medium to large, greenish yellow, with stripes and splashes of bright red and russet specks; tender, juicy, good. November to April.

Dumelow's Seedling.—Hardy, strong, spreading, productive; size medium, round, lemon yellow, crisp, brisk acid; juice retaining its freshness till June.

Fameuse, or Snow Apple.—For the Northwest this hardy variety of Winter apple, of Canadian origin, stands first on the list; tree spreading, early, and good annual bearer; fruit medium size, round, striped or green; tender, juicy, subacid. October to January.

Finck.—A very long keeper, productive and valuable for market or cider; succeeds well in the Ohio Valley.

Fulton.—Originated in Fulton county, Illinois, an annual and productive bearer; fruit medium, roundish, pale yellow, bright red cheek; tender, juicy, mild subacid, good. November to March.

Golden Russet.—English Golden Russet is its true name, though sometimes called the Golden Russet of New York, one of the best of the russet family; very hardy, and suited to the Northwest; a good grower, spreading top, free bearer, and requires wide planting; fruit, russet or yellow, crisp, juicy, rich. December to June.

Gilliflower.—There are the Black, Cornish, Red, and Scollop varieties, all having their season from November to February. The Scollop kind is largely grown and much esteemed in central and southern Ohio; fruit medium size, very egg-shape, light yellow, striped and splashed with shades of light and dark red; tender, juicy, with slight tinge of sweet. Too tender for the Northwest.

Grimes' Golden Pippin.—Much approved where known; fruit medium size, golden yellow, subacid, good. Successful, and regarded as very good in the Ohio Valley. December to March.

Hertfordshire Pearmain.—Hardy, and rich, strong soil gives fruit of the highest excellence; is best in northern sections; fruit medium size, brownish red, or yellow, mottled and slightly striped; tender, mild subacid, aromatic. December to February.

Hubbardston Nonsuch.—A superior fruit, good and popular, especially in the North, and improved by its transfer West, but not always hardy; producing good fruit in northern Illinois; fruit large, yellow striped, with rich red; mild subacid, juicy. October to February.

Jonathan.—A slender tree, hardy and very productive, and has proved one of the best Winter varieties for northern Illinois; fruit medium size, roundish, tender, juicy, and subacid; when fully matured is beautiful and first rate. December to February.

King of Tompkins County.—A handsome annual bearer; large size, and a number one

apple in quality. It is quite largely cultivated in New York and Ohio. In the South and the Ohio Valley it sometimes drops prematurely from the tree. December to February.

Lady Apple.—An upright tree—will bear close planting; fruit small and beautiful, a bright red color on a clear yellow; very profitable for the Philadelphia and Eastern markets—quality excellent. November to May.

Milam, or Blair.—Much grown in Michigan, Illinois, Ohio, and Kentucky, hardy and productive; though not quite a first-class apple, it has many good qualities, resembling the Westfield Seek-No-Further; fruit small to medium, green and red color. It is popular in some localities. December to March.

Minkler.—Regarded as pretty hardy, strong, spreading grower, and productive; size medium, handsome red, subacid, long keeper.

Newtown Pippin, Yellow.—Fruit greenish yellow with red cheek, a little crisp, of the very best quality. Large, handsome and favorite apple. March.

Newtown Pippin, Green.—Bears alternate years, apples of high flavor, and generally considered superior to the Yellow Newtown, both adapted to the rich limestone soil of the Ohio valley—the Yellow sometimes profitable, the Green never. January to May.

Northern Spy.—Hardy, handsome, and upright, but a tardy bearer; fruit large, roundish, bright striped upon green. Keeps well till April. It requires an age of at least twenty years before it will become profitable. Not suited to the South.

Peck's Pleasant.—Rather erect, vigorous, productive; does best on sandy soils, fruit firmer and keeps better, though not so large as on clay. "All who have tested it," says the Ohio Pomological Report for 1866, "commend it as one of the very best apples for early Winter"—suited especially to the North and East. Fruit medium to large; when ripe a clear yellow with a blush on the sunny side; tender, juicy, aromatic, subacid. November to February, and sometimes much later.

Perry Russet.—Hardy, vigorous, spreading; fruit large, roundish conical, yellow with russet patches, juicy, mild subacid, of excellent quality. Promises well for the Northwest. December to March.

Pomme Grise, or Gray Apple.—A hardy variety from Canada, especially adapted to Northern and Southwestern sections, and though a good bearer, it is of slender growth and small size, and fitted only for the garden; fruit small,

yellow-gray, tender and sprightly. December to February.

Raule's Janet.—Hardy, sure-bearing, and so productive as to cause it to dwarf in the orchard; is adapted to close planting; succeeds admirably in Missouri, and pretty well in northern Illinois; often escapes frost from coming into bloom late in the Spring; fruit medium size, conical, dull red, striped on green, rich, mild subacid. January to June.

Red Canada.—Tree slender growth; is productive in rich, strong soil; good and popular, especially in the North; fruit medium, red on yellow ground, juicy, sprightly, aromatic, subacid. One of the most valuable varieties for garden or orchard. January to April.

Red Romanite or Gilpin Apple.—Called also the Carthouse apple; tree spreading, hardy, and productive; fruit, small, roundish, deep red and yellow, firm, rich, juicy, but wanting in flavor—especially valuable and profitable for its late Spring keeping qualities.

Rhode Island Greening.—A superior apple in the New England and Middle States, from December to February; it is unreliable in the South, drops too early; probably for want of lime and phosphates; it is subject to bitter rot and speck in the West; while an experienced fruit grower in northern Illinois says he has in his orchard six trees of this variety, seedling-bodies, top-grafted, producing a small quantity of large, fine fruit. It is one of the coarse growing varieties, and needs wide planting.

Roman Stem, or French Pippin.—Succeeds finely on the dry prairies, and on rich limestone soils, and is productive; one of the best varieties in the Southwest, and the Iowa Agricultural Report for 1865 shows that it is hardy and popular in that State; fruit medium, oblong, whitish yellow, tender, juicy, and subacid. November to February.

Rome Beauty.—A native of southern Ohio, to which region its cultivation is chiefly confined; requires a rich, warm, loamy soil; a great annual bearer of large, showy, beautiful apples; fruit, a light rich yellow, striped with red, hangs on the tree late, keeps and sells well; is tender, juicy, with slight subacid, and agreeable flavor—a great beauty. November to February.

Roxbury Russet.—A fine variety at the East, but unreliable in the West and South; fruit, medium to large, moderately juicy, mild, subacid. January to June.

Smith's Cider.—Very hardy, spreading, bearing heavy crops every year, profitable and re-

liable, and much esteemed in the South and the Ohio Valley; fruit pale bright red and yellow, sometimes red with white specks, large and handsome, juicy and aromatic. November to February.

Spitzenberg, Esopus.—Much cultivated in the Middle States, Ohio, Michigan, Illinois, and Missouri; not much fruit in northern Illinois, and not generally as reliable and productive as formerly; it requires much lime and potash and considerable age for fruitage; it is not suited to the South; fruit, medium size, rich lively red on yellow, dotted and marbled, crisp, high flavored and delicious. January to March.

Swaar.—Originated on the Hudson; means "heavy;" not much known in the West; requires a rich soil, good in some localities; fruit medium to large, from a dull green it changes toward Spring to a brilliant lemon color, juicy, tender, subacid, with a spicy aromatic perfume. January to March.

Sweet Pearmain.—Sometimes called the English Sweeting, and RAMSDALL'S Sweeting; is largely cultivated in central Ohio and farther West; well adapted to rich soils; medium size, dull red, rough russet dots, tender, moderately juicy, sweet; highly valued for baking or eating, and for its good keeping qualities. December to March.

Tullman Sweet.—Tree hardy, fine spreading top, great bearer; fruit, medium size, yellow, rich, sweet, and excellent for baking. Good, especially in the North, and one of the best varieties for the Northwest. In twelve years after planting, ten trees of this variety in Winnebago county, Wisconsin, produced one hundred bushels of fruit in a single year. November to March.

Utter's Red.—Hardy, vigorous, and annually productive; fruit large, round, nearly white with red stripes, tender, juicy, fine tart, showy and valuable. September to February.

Vandevere Pippin, or Newtown Spitzenberg.—A popular apple in the Middle and Southern States, requiring a limestone soil, otherwise a dry bitter rot appears; an early and productive bearer, of the wide-spreading variety, and needs wide planting; fruit medium to large, orange yellow, striped, tender, aromatic, mild subacid. December to February.

Wagener.—Much admired in New York; a fruit grower in northern Illinois says "the body of the tree is tender, and should be grown on the tops of hardy varieties; a great and early bearer, and good keeper, fruit very good;" medium size, red striped and splashed on yel-

low ground, crisp, vinous, subacid. November to May.

Westfield Seek-No-Further.—Hardy, and popular for its good qualities in New England, the Middle and Western States, not-valuable in the South; succeeding well in Michigan, and “moderately productive” in northern Illinois and Wisconsin; fruit, medium size, light yellow ground, sunny side striped and splashed with red and russet dots; tender, subacid. November to February.

Willow Twig.—Hardy, originating in New Jersey, suited to the rich bottom lands and prairies of the West; an early and prolific bearer, and a great keeper; succeeds well in the West; fruit, above medium to large, second quality, rather dry, mild subacid. December to May.

Winter Wine Sap.—From New Jersey, and one of the very best varieties in the Central and Southern States, and in Oregon, and does very well in northern Illinois; hardy, early, and very productive; fruit small to medium, of a bright clear red, stained, striped, and yellow-spotted; in the South, a darker red, and patches of light yellow, juicy, tender, subacid. October to January.

Wood's Greening.—From New Jersey, hardy and spreading, and should be extensively planted in our Western and Southwestern States and Territories; E. G. MYGATT, of McHenry county, northern Illinois, speaks of three trees he has, twenty years old, as “hardy, good annual bearers, and quality of fruit much the same as the Rhode Island Greening;” fruit, medium size, juicy, tender, subacid. December to March.

We conclude our apple list with the three most commonly cultivated varieties of the crab apple:

Hislop Crab.—In size this fruit is a small apple, but sometimes an inch and three-quarters in diameter, and although classed with the family of Crabs, it is quite dissimilar, and can bear no comparison. It is ornamental, and bears young.

Red Siberian Crab.—It makes rich, firm, beautiful preserves when gathered before it is too ripe; the stalks should remain on. The Hislop and Transcendent crabs make good cider also, and answer an excellent purpose for cooking. The great merit of these crabs is to be found in their extreme hardness, standing the severest Winters in the Northwest.

Transcendent Crab.—The fruit is not so large and beautiful as the Hislop, yet its early, perpetual, and prolific bearing renders it very val-

uable. It sometimes bears when only two or three years old.

Apricots.—The apricot is a tender tree, and succeeds where sweet cherries do; the small yellow wild plum of the Western States makes one of the best stocks for it. The stones grow readily, often producing very good sorts with an increased hardness and productiveness. The apricot is one of the most refined and peculiar of all the stone fruits; and it possesses an exquisite flavor that is not found in any other fruit. It is very prolific and would bear bountiful crops annually if not destroyed by the curculio. The apricot tree, when young, in good ground, is a rampant grower, and if left to itself will produce long naked branches in consequence of its growing only from the terminating buds and those near the top of each year's growth, leaving the lateral branches and fruit spurs feeble. In order to obviate this and develop the fruit good all through the tree, there should be only branches enough to form a nice open head and these shortened every season. This removes those radical buds at and near the ends of the new growths, and brings the sap to feed the growths from the side buds, which produce fruit branches and fruit spurs. Decidedly the best way to do this pruning, is by pinching the ends of the tender growths off when they are a foot long.

Cherries.—The American Pomological Society declared in 1868, that cherries are capricious, and beyond the Early Richmond, May Duke, and Morello, there seems to be none that can be called universal favorites. The Early Richmond, known in the South as the Early May, is regarded as the most valuable cherry for the West and Northwest. There are in Illinois two cherry orchards of this variety of six hundred trees each, four of a thousand each, and one of two thousand trees—these for the Chicago and other Western markets. The large English Morello, which comes a month later, is the only other sort put on the list for the Illinois markets. “The Early Richmond,” says TILTON's Journal of Horticulture, “succeeds nearly or equally as well in the Eastern and Middle States, and should be more extensively cultivated than at present.” The Morello is regarded as the best stock on which to graft these two varieties.

The Wisconsin Horticultural Society recommends the Early Richmond, the Kentish, and Morello varieties for the Northwest, the

Heart and Bigarreau varieties proving too tender for the cold Winters of that region.

In milder sections of the country, the Black Tartarian, or Black Heart, the Carnation, Cleveland Bigarreau, the Governor Wood, the Gaffion, or Yellow Spanish, Kirtland's Mammoth, Red Jacket, and Tecumseh—the two latter late varieties—will richly repay cultivation.

The cherry is a very difficult fruit to graft, and to succeed at all the scions must be cut before the buds have shown the least sign of swelling, and buried in the ground or otherwise secured against drying, till wanted for use.

Dwarf cherries, trained as pyramids are worthy the attention of those who despair of success in the ordinary modes of cultivating this delicious fruit.

The Canadians have a successful way of protecting cherries from birds, by the use of stuffed hawks perched on the trees or above them.

Cherries should never be gathered except when perfectly dry. We have known them to decay entirely in twenty-four hours when gathered while wet. It pays also to carefully sort cherries for market, on a table, picking out any mashed or wormy or imperfect fruit before sending to market. Of course, the stems are, or always should be, attached, although we have occasionally seen them in market looking more like round cranberries than cherries.

Figs.—Asia and Africa are the native regions of the Fig. It is also much grown in the Southern States; we have seen them growing in the open air, without Winter protection, in the neighborhood of Baltimore, and a writer states that he can grow them as easily and surely in New York as he can the choice kinds of raspberries. Among the best varieties for open culture are the Brown Turkey fig, Brown Ischia, and White Ischia—the latter a very small sort, one inch in diameter. The Nevil is the richest cultivated in England, and the Pregussata is a favorite for growing under glass. In the Middle States figs should be grown as dwarfs or low shrubs, if at all, well covered in Winter, and kept root-pruned, to prevent too much growth of wood. The fig is easily propagated by cuttings taken off in the Spring, the lower or cut end inserted in a good-sized potato or turnip, and planted in soil naturally calcareous, or made so by the use of lime. In warm climates the fig tree gives two crops a year; in the Middle States but one.

Nectarine.—This is similar to the peach, the trees of both appear very much alike; it was originally from India, a wild variety of peach, small, smooth-skinned, and of piquant flavor. Grown under glass, or at the South, where the heat is more uniform and of longer continuance than at the North, the fruit is really fine; but as grown in the Ohio Valley it is inferior to the peach, having the peculiar flavor of the pit. It is somewhat less hardy than the peach, and the fruit makes a popular dessert. Smooth-skinned, like the plum, it is liable to attacks from the curculio. The Boston, Downton, Early Violet, and Elruge are all good varieties.

Peaches.—The peach is believed to have originated in the poisonous almond. Its fleshy parts were used to poison arrows, and it was for this introduced into Persia. The transplanting and cultivation, however, not only removed its poisonous qualities, but produced the delicious fruit that we now enjoy.

Peaches, says Dr. WARDER, are always acceptable and easily grown, and they come into bearing at an early age, usually the third year. Unfortunately, they are not so generally successful as they were at the first settlement of the country, when every log cabin had its annually laden group of peach trees. Now they are uncertain bearers, because the flower-buds are often injured by the severity of the Winters or Spring frosts, climatic conditions that appear to have resulted from the clearing up of the forests. When we do have a crop, the fruit is often seriously damaged, by insects, and by the invasion of fungus, both of which troubles were unknown to the early settlers of the country. The peach will grow on almost any soil, but light, sandy, or gravelly lands, and elevated situations, seem best adapted to it. The trees should be but one year old from the bud, cut back to a bare stem, about two feet long, before planting; they should be set from fifteen to twenty feet apart in the orchard, or even closer; they should be planted in the Spring, and the ground cultivated continually.

All pruning, continues Dr. WARDER, should be done while the tree is young, as large limbs do not heal over, like the pear and apple. Shortening-in the branches may, however, be done with great advantage if it be undertaken while the trees are young, and continued from year to year. The result will be the production of fruit-bearing twigs all over the tree, instead of the blossom-buds being only on the

ends of the branches. This treatment will be followed by a dense growth of twigs, some of which will have to be removed, to keep the head of the tree sufficiently open. Thinning the fruit, as well as the twigs, will have the happiest effect in improved size, color, and flavor. The two operations of shortening-in and thinning may often be carried on simultaneously. Trees so treated live longer, are broken down less by the wind, and produce larger and better fruit, which is more easily gathered than from trees grown by the old method. Lime and bone dust will be found especially beneficial in perfecting healthy trees.

Peaches are divided into clings and free-stones, of all colors; the former are the best, the latter the most popular in market. Dr. WARDER gives the following varieties:

Freestones—White Fleshed.—Early Tillotson, Early York, Hale's Early, Large Early York, Morris Red, Oldmixon Free, the President, (which escapes the curculio), Red Rare Ripe, Stump-the-World, and Ward's Late.

Freestones—Yellow Fleshed.—Barnard, Bergen's, Columbia, Crawford's Early, Crawford's Late, Melacoton, Red Cheeked, Smock, and Yellow Rare Ripe. To this list might be added an American peach, called George the Fourth, which produces fruit of the finest quality—tender, melting, juicy.

Clingstones—White-Fleshed.—Grand Admirable, Baltimore, Heath Cling, Large White, Oldmixon Cling, and Rodman's Red.

Clingstones—Yellow-Fleshed.—Lemon, Orange, Tippecanoe, and Washington.

Deep Red-Fleshed.—Blood Cling, or Claret, and Blood Free.

N. P. HEDGES, of Western New York, suggests that in the propagation and cultivation of the peach there are certain leading facts that require more attention than has been hitherto given to them:

1. The whole tree, root and top, should be adapted to our length of Summer.

2. A small peach stone, like small corn, will become perfect sooner than a large one; consequently, it is an indispensable sign of hardiness, and should always be used for roots where budded trees are produced.

3. A dwarfish tendency or shortish growth, causing the buds and twigs to become perfect while the weather is yet warm, is indispensable. Such trees will cast their leaves early, and are not liable to freeze back easily.

4. A large blossom is very desirable; it not only wraps the embryo peach more securely

through the Winter, bringing the fruit buds safe through a cold Spring to the time of blossoming, but in case of a Spring frost, when fruit trees are in full bloom, as May 12th, 1865, mercury at 28°, when apples and pears and cherries were pretty much all killed (at my place in Bennington, Wyoming county, New York), while nearly a thousand peach trees, fully in bloom, were uninjured, and bore a very heavy crop. These trees are known here as the Canada seedling. They have the above peculiarities in a marked degree. The peach of this variety is good to best, and took the first premium at the Wyoming County (New York) Fair.

Shelter, said J. F. C. HYDE, before the Massachusetts Board of Agriculture, in 1868, is of the greatest importance with this fruit. It is said that very cold weather will kill the fruit buds, and so it will when they are exposed to the cold winds; but in sheltered places they will withstand a great degree of cold without injury. One-year-old trees are the best to plant; and they should be cut back one half or more, and so every year the new wood should be shortened in. The tree so treated becomes more compact and symmetrical, and is less liable to be broken down by the winds, ice, and snows of Winter. They should, when planted in an orchard, be set from ten to twelve feet apart each way. Both peaches and cherries are injured, and often destroyed outright, by excessive manuring.

At the same meeting of the Board, I. K. BROWN related that a farmer in Acton, Massachusetts, has a peach orchard of two hundred trees on an acre of ground, planted between apple trees, on land that is high, stony, and gravelly. One year he received \$350 net for his peaches; another year they netted him \$400. Mr. BROWN mentioned a peach orchard of eight hundred trees he had visited in New Hampshire, set about twenty feet apart, that bore well. *They were thoroughly mulched.* They were about eight feet high, and so level that you could look across the tops of the trees. They were almost as level as a floor, he takes such pains to head them in. The branches were eighteen inches long, but the peaches were up next to the stem of the tree. The owner cuts out the middle shoot, and lets the two side shoots go ahead. He keeps the whole tree headed in, and the top twigs come down within eight inches of the ground.

A correspondent of the *Iowa Homestead*, states: "I raised this season one bushel of

choice peaches on one tree four years old. By the same method I have seen one tree in Iowa bearing every year for the last ten years. Any one can do the same by strictly following these directions, viz.: When quite young, set the tree in the ground with all the roots running north and south, and thin the tree to a fan shape, with edge in the same direction as the roots. When the tree is past three years old, after the leaves are off in the Fall, lean it toward the west until the branches nearly touch the ground. This can be done easily, as the roots which run north and south will be only slightly twisted. This should be the permanent position of the tree, and it should never be righted up. The suckers, or water-sprouts, should be kept stripped off during the Summer, or the vitality of the tree will run to sprouts.

"The end of all the branches should be clipped about the first of August to force the sap into the fruit buds. Every Fall, before cold weather sets in, cover the tree with brush, to keep it close to the ground, and with straw over the brush, to protect fruit buds from the cold—and uncover in the Spring about the 10th of May.

"Thus, by a little care and labor, every year, an abundance of that delicious fruit can be raised at home, affording a great pleasure, and saving expense of exportation from a distance."

At the meeting of the Illinois Horticultural Society, in 1864, G. W. MINIER, of that State, said, that he once accidentally put corn stalks in the Fall around a peach tree, which were not removed till in April, the fruit buds were thus protected, and the tree bore peaches; and SUEL FOSTER, of Muscatine, Iowa, observed, that a neighbor of his has been in the habit, for a few years, of bending down some lateral branches of his peach trees, and laying brush upon them, and has succeeded in raising peaches from these branches when no others were grown in that vicinity.

Mr. CLEMENT related, at a meeting of the Massachusetts Board of Agriculture in 1867, that a farmer in Middlesex county, in that State, had a tree, one of the branches of which lay almost horizontal, very near the ground, and in the Autumn he threw a load of corn shucks all over it, and hence the fruit buds were not killed. When Spring came, he uncovered it, and that one branch bore a fine crop of peaches. Before the same Board, in 1868, I. K. BROWN said: "Most of us get peaches, almost every year, from branches that lie on the

ground and are covered with snow. Therefore the tree needs protection."

There is no doubt that peach trees in the open ground may be so dwarfed as to be laid down and covered in the Winter. The best way is, probably, to form fine straight branches taken as near the ground as possible, and keep them closely pruned and tied down to stakes, so that the outer ends will rise but two or three feet above the ground, according to the length. Mr. CAMP, of Pennsylvania, has thirty trees laid down every Winter.

At a recent meeting of the Northern Illinois Horticultural Society, Mr. BINGHAM, of Freeport, stated that he lays down his peach trees for the Winter, by digging under one side a pit large enough to contain the whole tree; into this he lays the tree, compacted by hay ropes, and covers all over with earth and mulch, taking up in Spring when the blossoms begin to open. His success for three years has been complete.

The late EDWIN B. QUINER, author of the *History of Wisconsin in the War of the Rebellion*, who had devoted many years to fruit culture and experiments in Wisconsin, gave his plan for peach raising in the Northwest: Head in the new growth of the tree toward the close of Summer so as to harden the balance of the limbs, and better perfect the fruit buds; cut a trench two feet deep some three feet from the tree, and encircling it for water, ice, and snow to gather in during the Winter; and as Spring approaches, fill the trench, if not already full, with snow and ice, and bank around the trunk with the same, covering the whole with a thick mulch, so as to keep the blossoms back till after the late frosts.

A fruit grower in Marquette county, in northern Wisconsin, has succeeded in raising peaches by having a rude sort of a sentry-box placed around each tree, top and body, and filled in closely with straw or litter, and removing the whole after the Spring frosts.

GEORGE P. PEFFER, an experienced fruit grower of Waukesha county, Wisconsin, stated at the February meeting, 1869, of the Wisconsin Horticultural Society, that he had grown peaches for several years on the north side of a hill, without any protection but the snow banks, but somewhat shaded from the sun in Winter; but he had always noticed whenever the thermometer fell below sixteen degrees below zero, that the peach buds were always killed, though the trees were uninjured, and whenever a Winter passed in which the ther-

mometer did not reach that point, then his trees would bear.

L. BARTLETT, of Warner, New Hampshire, states that he obtains regular crops of peaches by keeping the branches bent down near the earth, where they are confined by hooked wooden pins. The covering of snow—for they have it in plenty there—protects the fruit buds from the cold. He has found that trees so treated, ripen fruit ten days earlier than when entirely exposed. Covering such prostrate branches with corn-fodder, or with a dense mass of evergreen boughs, in the absence of snow, has answered equally well. It is more difficult to protect those limbs some feet above ground, as they are exposed on all sides to the wind, and do not receive the warmth of the earth.

It is thought in the South that the peach tree is killed on the southwest side by the vicissitudes of heat and cold in the early part of the season. The Springs advance very slowly in those temperate latitudes, making a barely perceptible advance in the course of a week. The warm days of February start the sap on the southwest side by or before the middle of the month, if not protected from the sun, after which, even to the first of March, as far south as Montgomery, Alabama, they are liable to sharp frosts, sometimes sufficient to freeze the sap, which, in its expansion, bursts the bark on that side of the tree, and the scorching sun and dry winds of Summer complete the work of destruction. They suffer from unseasonable heat, followed by unseasonable cold in Spring, and excessive heat and dry winds in Summer.

So great a luxury is the peach, that there are some persons who are willing to take unusual pains to raise them. "Cultivating peaches in pots, and taking them into a cellar or hot-house in Winter," said ASA CLEMENT before the Massachusetts Board of Agriculture, in 1867, "is safe, but is of course somewhat expensive. Still, it is worth trying. If by planting a dozen trees in tubs or pots—a cheap article—so that they can be taken in during the Winter, and placed where they shall not be injured by our severe seasons, we can secure a crop, I think it would be better to have them. My experience is, that a little freezing will not hurt them, but I am not sure of that. I know peaches are raised in that way. I have seen them on the tables of the Massachusetts Horticultural Society, and it was a very beautiful sight—exceedingly ornamental. A little tree,

the size of a whip-stock, three feet high, trained symmetrically and handsomely, with four or five dozens of early Crawfords upon it, looks beautifully. I do not know why people who raise things for ornament should not go in for peaches as well as every thing else. They certainly would be ornamental, and I have no doubt profitable for the Boston market, where I learn some of the fairest peaches sell for a dollar a piece." "Three dollars," responded Mr. HYDE; and I. K. BROWN added, "I have raised them in pots, and am doing it still. Very fine peaches can be raised in that way, but they require greater care than a common farmer, who is engrossed by his every-day duties about his farm, can bestow upon them."

Dr. NATHAN DUFFEE, of Fall River, Massachusetts, related his experience in growing peaches under glass, at the meeting of the Agricultural Society of that State, in 1868: "It is something like fifteen years since I commenced. I had a house seventy-two feet long. I put a trellis against the wall of that house, and planted six trees, spreading them out fan-like upon the wall. I then had a trellis built in front, upon which I put six more. These trees, with the exception of one or two which have decayed, have borne every year from the first year they were set out, and I have had an abundance of fruit from those trees, of the finest quality. It has been said that you can not get the peach in perfection under glass; that the fruit is watery, and insipid to the taste, but I think I can say that as fine peaches as ever grew have been grown under that glass for now something like fifteen years, and in great abundance; for I have had, every year, to thin them out more or less to prevent injury to the trees. Oftentimes I have taken off five out of six of every lot that exhibited itself on the trees, and then had an abundance of fruit.

That is the only way in which I have been able to cultivate the peach at all. I tried its cultivation on a trellis against a wall out of doors, and I found a Northwest exposure was far better for the crop than any other exposure. I think a hot, scorching sun injures our peach trees more than anything else, especially after a rain. I have noticed that when we had a shower of rain, followed by a hot sun, it almost invariably killed the buds, and I had no crop. I think, if any one desires to cultivate the peach, the best way is to try it under glass. I think it may be made profitable. I do not make it profitable, because I prefer to have the pleasure of giving them away, rather than to

sell them. But I do not think the yellow peach, under glass, can be brought to that perfection that a white peach can.

The Van Buren Golden Dwarf peach originated in Georgia with Mr. J. VAN BUREN, an eminent pomologist, and was supposed by him to be an accidental cross between the Italian Dwarf and Van Zandt's Superb; it is a mere shrub, a natural dwarf, never attaining a height of more than four or five feet. The fruit is of large size and good flavor. Where cultivated extensively near Harrisburg, Pennsylvania, it has proved very productive. The advantage of this dwarf variety is, that it can be easily covered in Winter, and the hope is cherished that it may thus succeed where it is too cold for larger varieties. It is quite ornamental, the leaves being large, and the foliage dense.

To preserve it during the Winter in the colder latitudes, it might be planted in rows four or five feet apart, and toward Winter, a slight trench, a few inches deep, dug on each side of the row, perhaps two feet apart; in these insert boards so closely together that mice could not get through, reaching as high as the trees, somewhat wider apart at the top than at the bottom, with slats tacked across to hold them together, and then pack in straw or litter, and if the whole could be covered with snow, all the better. If not thus set in close rows, they could be thoroughly wound with straw, and a barrel placed over each. Even if the extreme cold of the Northwestern Winters should prevent their fruitage, they will well repay this trouble of protection in their charming ornamental appearance. L. H. LYMAN, of Palmyra, Wisconsin, is introducing them into the Northwest.

Peaches, and other stone fruits, should generally be allowed to reach perfect maturity, or within four or five days of it, on the tree. In moist, cool seasons particularly, they are benefited by being gathered a few days before maturity, and allowed to ripen in a dry, warm room; they part with the water contained in their juices, which become better elaborated, more sugary, and better flavored. They should be carefully gathered with thumb and finger, pressed as lightly as possible, for first a brown spot, and then decay is sure speedily to follow anything like a squeeze or a bruise. If the bloom, or fuzzy coating on the fruit, is rubbed off by rough handling, its beauty of appearance is injured, and it will decay all the sooner for it. Formerly it was supposed that the peach must be gathered before fully ripe in order to

ship it any distance; but practical experience has proven that *ripe* fruit, not quite soft, will carry just as well as unripe, and command a much better price.

Pears.—Out of some two thousand varieties of pears described, and known to those who make pomology a study, only about seventy or eighty are counted as truly valuable and profitable to grow, when season, size, productiveness, and hardihood of the tree are taken into the account; and these seventy or eighty might safely be reduced to twenty varieties. Hon. M. P. WILDER, in his orchard near Boston, has no less than nine hundred different kinds in bearing. It was said at the meeting of the American Pomological Society, in 1868, that pears are perhaps less cosmopolitan than apples, yet the following are spoken well of in most parts of the United States and Canada; Bartlett, Belle Lucrative, Beurre d'Anjou, Flemish Beauty, Louise Bonne de Jersey, Seckel, Tyson, Vicar of Winkfield, Winter Nellis; and he who can grow these, or the half of them, is well off. Hon. HANS CROCKER of Milwaukee, Wisconsin, has seventy varieties in cultivation, and after several years' trial, has tested the following kinds as doing well in his locality on the western border of Lake Michigan: Bartlett, Rostiezer, and Tyson, of the Summer varieties; Flemish Beauty, Beurre d'Anjou, Dutchess d'Angouleme, and Louise Bonne de Jersey, of the Autumn, and Winter Nellis and Lawrence, of the Winter, varieties.

Summer Varieties.—Bloodgood, Brandywine, Dearborn, Doyenne d'Ete, Early Bergamot, Early Butter of Cincinnati, Gifford, Golden Butter, Jargonelle, Osband's Summer, Rostiezer, Tyson, and Washington.

Autumn Varieties.—Bartlett, Belle Lucrative or Fondante d'Automne, Beurre Bosc, Beurre d'Anjou, Beurre Diel, Beurre Superfin, Buffum, Dutchess d'Angouleme, Edmond, Flemish Beauty, Howell, Kirtland, Louise Bonne de Jersey, Onondaga, Oswego Beurre, Seckel, Sheldon, St. Ghislain, Urbaniste, and White Doyenne. The Flemish Beauty is pre-eminently the pear for the Northwest, and the Buffum is probably the next most hardy variety, and both are very productive.

Winter Varieties.—Beurre D'Arenburg, Cattillac, Dana's Hovey, Easter Beurre, Glout Morceau, Lawrence, Lewis, Passe Colmar, Pound, Vicar of Winkfield, and Winter Nellis; of these the Easter Beurre is the longest keeper, and the Winter Nellis the hardiest, and the

Glout Morceau and Lawrence the next most hardy varieties. The Catillac will keep till April.

Most orchardists, says Dr. WARDER, prefer to have their trees worked on the pear rather than on the quince or other dwarfing stock. Dwarfs are very satisfactory for limited grounds; if properly managed, they will bear the third or fourth year from the graft; they require high culture and judicious care in trimming and training to make them yield their best results—the new growth should be cut back at least one-third, about the middle of August, that the next growth may form fruit buds. The two styles should not be planted together. The *Horticulturist* says its editor set a dwarf pear orchard, four feet by eight, and admits that while they are all healthy, and have retained their fruit better than others more widely separated, yet they seem growing one way pretty closely together—eight feet apart each way would doubtless be better. Dr. WARDER says pear trees will bear crowding, as most of them are of an upright habit; fifteen or twenty feet apart is wide enough for the majority of the sorts in cultivation, and many will succeed if planted much closer; and the trees should not be grown as standards, with tall, naked stems, for they do much better if trained from the first in a conical form, when they are generally called pyramids—causing them to branch low, curbing the growth by Summer and Winter pruning, thinning them out and shortening them in such a manner as to keep the lower branches always the longest, thus well exposing to the sun and air all the twigs, foliage, and fruit.

Any good loamy soil, with a predominance of clay, will produce thrifty pear trees; they need lime and phosphoric acid, and therefore bones may be profitably applied to lands deficient in these elements. A mulching of six inches of straw over the ground during the Summer serves as a porous blanket, preventing the effects of drought in midsummer, checking the growth of weeds, yet allowing a free circulation of air and moisture about the roots of the trees. This mulch should be removed about the middle of September to allow the young wood to harden before Winter, and to prevent the harboring of mice around the trees during the cold season.

As we have seen, Dr. WARDER endorses the more recent practice of grafting the pear upon pear stock. Hon. M. P. WILDER states his experience as favorable to grafting on the quince. They should be planted deep enough

to cover the place of junction, three or four inches below the soil, and then the pear will throw out roots from itself. He adds, that he has dwarf pear trees on the quince stock twenty-five years old, which produce annually a barrel or more of fruit each, and give every promise of longevity. Dwarf pear trees have survived a century, and we know not how much longer they may live. As a general rule, says Mr. WILDER, no tree will succeed for any great length of time, where it is grafted on any other than its own species; there are, however, exceptions to this rule, and, among them, some varieties of the pear, which grow vigorously, bear abundantly, and seem better adapted to the quince than to their own root. There are, he adds, three considerations which are absolutely necessary to success, viz.: A deep rich soil—the planting of the quince stock entirely below the surface of the ground—and a systematic and scientific course of pruning, as the tree progresses in growth. GEORGE W. HARRIS, of Rockville, Illinois, grafted pear scions on the common thorn apple, the second year it produced a few blossoms, and the third year the top measured thirty feet in circumference, and twelve feet across at the widest place, and bore a bushel or more of very fine pears. Dr. WARDER contends that grafting on the thorn gives no exemption from weakness of the tree, the blight, nor cracking of the fruit. Another experimenter says pears are generally improved by grafting on the mountain ash.

A pear tree near Vincennes, described some years ago by Rev. H. W. BEECHER, was taken from Pennsylvania in 1802; it produced one hundred and forty bushels of fruit in 1857; and Dr. WARDER states, that it has yielded one hundred and eighty-four bushels in a single season, and bears every year—the fruit being of good size, and tolerable flavor, ripening early in the Fall. The girth of the tree at one foot from the ground was ten feet, and at nine feet from the ground was six feet and a half. The soil in that region is rich and deep, and the tree stands in an open field, far from any other tree, and at a distance would easily have been mistaken for a spreading oak.

Of two thrifty Flemish beauties, of apparently the same age, near Madison, Wisconsin, the one standing most distant from other trees, had the widest spreading top, and produced much the largest yield of fruit. A pear of this variety, raised at Winona, Minnesota, and exhibited at the La Crosse Fair in September, 1865, measured eleven inches and three-fourths in circum-

ference, and weighed fifteen ounces. Its growth in the rich Mississippi bottom probably enhanced its size.

The pear is a long-lived tree, and withal it is beautiful as an object in the landscape. The old Stuyvesant pear tree in New York city, has borne several crops of fruit since it has attained the age of two hundred years. There was a pear tree in full health and bearing, in New Haven, Connecticut, a few years since, then one hundred and sixty-nine years old. The aged pear trees at Detroit, planted by the French during the last century, are familiar to many. They are planted upon a sandy loam and rest upon a thick stratum of clay.

ROBERT DOUGLAS, of Waukegan, in northern Illinois, a very successful pear grower, states that "the pear will flourish on any prairie soil in which there is a mixture of clay and loam, if so elevated as to prevent the roots from coming in contact with standing water. As a general rule, the more elevated the better, as the roots of the pear go so much deeper than is usually supposed; and it is very doubtful whether land in which water can be found for months together, within three or four feet of the surface, can ever be made suitable for a standard pear orchard, even if thoroughly underdrained to that depth; though dwarf trees would do well on such land, as the quince roots grow near the surface of the ground. There are comparatively few prairie farms on which there is not an elevation several feet above the ordinary level; on such a site, even if too flat to let the water pass off freely, the land can be plowed in ridges, upon the top of which the trees may be planted; if underdrained, so much the better, placing a drain equidistant from the rows of trees."

In the report of the American Pomological Society's recent meeting at Rochester, New York, one of the members stated, that good Winter pears could not well be raised because of the delicacy of foliage peculiar to many varieties causing them to drop their leaves prematurely. All orchardists, says the *Ohio Farmer*, know that good and perfect leaves are requisite to perfect ripening of fruit, but all perhaps do not know that manuring the pear with a solution of the sulphate of iron—copperas water—will prevent leaf-blight, and keep the tree in full vigor to the end of the season. The pear seems to be particularly well adapted to this treatment, says the *British Medical Journal*; and old nails, thrown into water and left

there to rust, will impart all the necessary qualities for forcing fruit.

Summer and Autumn pears require to be gathered, as a general thing, from a week to a fortnight before their maturity. Sweet varieties, and such as are inclined to become *mealy* are entirely worthless when ripened on the tree, and many very excellent varieties are condemned on this account. Such as these should be gathered the moment the skin begins to change color in the least degree; but nearly every variety is improved in appearance and quality by keeping in close, dark drawers, wrapped in flannel or soft paper, or packed in bran a few days.

Plums.—Among plums, Coe's Golden Drop, Green Gage, Imperial Gage, Lombard, Smith's Orleans, and Washington, seem to have the widest popularity, and if the curculio and black knot would only let these alone we need hardly sigh for more.

A writer in the *Western Farmer*, thus wisely counsels with reference to plum culture, especially in the Northwest: "The most hardy tree is liable to suffer by a severe Winter if it is not thoroughly prepared for the trial. That is, if its growth is not completed and its wood fully ripened before Winter sets in. Three causes often operate on our plums to prevent this thorough preparation. One is a blight which causes them to shed their leaves in early Autumn; another is an excessive crop of fruit, which so enfeebles the tree that it can not prepare for Winter; another and more common is a luxuriant Autumn growth, only checked by severe frost, which finds the wood soft and full of sap. Any of these causes, if the Winter is severe, are sufficient to ruin the tree. The native stock will do much to prevent the last named; for proof of this we have only to remember that the native plums in our groves always cease growing and are thoroughly ripened very early in Autumn, and of course this influence helps the graft to do the same. With native stocks, and the assistance we can give by stopping cultivation at midsummer and pinching the growing points in August, there is little danger of too late growth. The great and early bearing qualities of the native, are also strong reasons for using it. Then it is accessible to all, and great results may be attained by planting trees from the woods, one or two inches in diameter, and grafting them at about two feet from the ground; such grafts will bear fruit

the third season, and though they may ultimately overgrow and break off they will pay expenses and compound interest.

In some portions of the Northwest, recourse is had to the wild native varieties, selecting those in the Fall whose fruit has proved good, sweet, and juicy, transplanting them in the Spring, cutting them back and pruning them, and in the course of three or four years they will bear plentifully of improved fruit.

The Miner Egg Plum, evidently an improved Southern wild plum, is proving hardy and successful in portions of Wisconsin where it has been cultivated.

In a paper read by GEORGE P. PEFFER, before the Wisconsin Horticultural Society, in February, 1869, he gave it as his opinion that plums can be easily grown in all parts of that State; and named the following that will stand certain degrees of cold, and will fruit in some seasons, but not in others, when the cold is too great:

Those that will stand from twenty to twenty-five degrees below zero are the Lombard and its seedlings, Blecker's Gage, Imperial Gage, Duane's Purple Gage, German Prune, and the White and Blue Damson.

Those that will stand from sixteen to twenty degrees below zero are the White, Yellow, Red, and Purple Magnum Bonum or Egg Plum, Coe's Golden Drop, Huling's Superb, Reine Claude de Bavey, French, McLaughlin, Manning's Long Blue Prune, Horse Plum, Bingham's Gage, Green, Red, and Purple Gage, Fotheringham, Blue, White, and Red Perdrigon.

Those that will stand only from fourteen to sixteen degrees below zero are the Washington, Jefferson, Early Royal, and Peach Plum.

Among the desirable varieties, adapted to a milder climate than the Northwest, may be named, River's Early Favorite, Smith's Orleans, Drap d'Or, Luscomb's Nonsuch, Prince's Imperial, Nectarine, Schenectady Catherine, Blue Gage, Roe's Autumn Gage, Flushing Gage, Blue Imperatrice, Kirk's Plum, and Yellow Gage.

There is a secret, says COLMAN's *Rural World*, about plum raising. "We have discovered it in traveling over the country. We never visited a large plum orchard in all our life that we did not find plenty of the fruit. And we never visited any place with eight or ten trees and found a good crop of this fruit. Now these facts set us to thinking; and the result of our thoughts is this: That it is very

easy to have all the plums you want to eat and sell. The secret connected with plum raising is to plant plenty of trees, so as to give fruit to the curculio and to yourself also. If you will plant fifty or a hundred, or two hundred trees, you will have fruit enough for everybody. Every such orchard that we ever visited had plenty of ripe fruit. Some even complained that the curculio did not thin out the fruit enough—that the trees were overloaded."

Plums should be set near the frequented portions of the house and yards, where fowls and pigs run, if practicable, as the curculio is said to be shy, and often frightened away by people passing and repassing. Besides, the chickens and pigs are apt to destroy them or their eggs. The natural life of a thrifty plum tree is from twelve to thirty years, and we should study the proper conditions to promote its longevity. Owing to the curculio, says Mr. PEFFER, many trees are robbed of their fruit before its maturity; and, of consequence, the trees make an extra effort to produce their species, and so they will set so full of blossom buds, for the next year, that they are killed by this effort to produce fruit. During our sunny days in Winter, these trees, overloaded with buds, evaporate what little sap is left in them before Spring arrives, and so they are killed outright from overexertion.

In treating elsewhere of noxious insects, the curculio will receive proper notice.

Quinces.—In France stand quince trees more than a hundred years old, and Hon. M. P. WILDER says he knows of one in Massachusetts forty years old, which has produced ten bushels of fruit in a single year. The *Germantown Telegraph* says they can be raised as easy as apples and pears in this way: "There is no secret about it. Get the 'Orange' variety. See that they are entirely free of the borer before planting. Set six or eight feet apart in rich soil—some recommend as much as fifteen feet. Bandage the stem with two or three wrappings of old muslin, or any kind of cloth, as far down in the ground as possible, as the roots start from near the surface. Let this bandage run six or eight inches above the ground, then pack the soil compactly a couple of inches around the bandage, and renew this early every Spring. Fine, large golden quinces, rivaling the largest oranges, will bless your efforts every year.

"Should the borers, by any means, steal in, ferret them out carefully with a piece of wire.

Should they, however, get the advantage of you, and your trees become honey-combed, set out again young trees, so that by the time the old ones are gone the young trees will be finely in bearing.

"The quince is the richest of all the fruits of its class for preserving and drying. For preserving, it is expensive, requiring good sugar, pound for pound; but, in our judgment, it is much better dried, and then stewed as wanted for use, like apples; and in this form it is as cheap as apples. It is a fruit which is very seldom dried—why we know not, for a dish of dried quinces stewed, with only a little sugar added, makes the richest and most relishing table sauce that can be imagined. It has all of the rich flavor of the quince without any of the tough, gummy qualities so common to quince preserves, and they should be cultivated wherever it is possible, far more extensively than they are, if only for the purpose of drying."

The quince may be grafted on the pear six or eight inches above the ground, and thus escape the borer, which works near the ground; prune properly, keep the ground well spaded, scatter a peck of coal ashes around the roots of each tree, and from one to three pints of salt. Next to the Orange, Ray's Mammoth deserves cultivation. Quinces should never be budded.

Mr. OHMER, of Dayton, Ohio, who has had good success in raising quinces, says he spades the ground of his orchard every Spring, and scatters a peck of coal ashes around each tree. He finds common salt the best manure on the quince, and applies about one quart to the ground under each tree, after the soil has been spaded, and another quart when the quinces are about half grown. He sold in one year three hundred bushels of quinces, from his orchard of three-quarters of an acre, at \$2 50 to \$3 per bushel. This fact is worth a thousand arguments in favor of planting and cultivating the quince.

Fruit Culture in California and Oregon.—From an able paper on the resources of California, by H. D. DUNN, of San Francisco, in the United States Agricultural Report for 1866, we gather these facts: "Peaches grow well there, and are to be had of a size and a flavor that can not be surpassed elsewhere. In some districts the curled leaf disease has prevailed, but has not so far caused great damage, considering the large number of trees and their imperfect culture. Quinces grow to a size and have a flavor not exceeded in any country. Plums are produced in great quantities, their

abundance being so great as often to break down trees by the weight of fruit. Prunes of all kinds, so far as tried, have done well. Cherries are of extra size, the trees healthy, and great bearers, and are a most profitable fruit to raise. Nectarines and apricots, of unsurpassed appearance and flavor, are also produced. The following are the largest specimens of fruits exhibited in San Francisco, viz.: Apples (Gloria Mundi variety), 32 and 34 ounces; pears, 84 ounces; plums, 7 ounces; apricots (Moorpark), 16 ounces; peaches, from one-third to one-half size larger than the same varieties cultivated in the Atlantic States. All of these fruits are free from the ravages of insect life."

Oregon, is also an excellent fruit country. Apples sometimes attain a weight of two pounds, and Winter pears from two to three pounds. Peaches, plums, cherries, and grapes do well. They do not attain quite the size of the California product, but are much larger, and the yield more reliable, than in the Atlantic and Central States. California excels Oregon in grapes and peaches; but her fruits there do not keep as well as those of Oregon. Apples raised in California will not keep beyond Autumn; while the Winter varieties raised in Oregon are good keepers, and go far to supply the deficiency of California.

SEMI-TROPICAL FRUITS.

Orange.—The culture of the orange tree in this country is mostly confined to California and Florida—in the latter State it grows wild, and is transplanted, and budded, and each tree soon bears from five hundred to twenty-five hundred sweet oranges. Nearly one hundred thousand trees were set out in Florida, in one single year since the war, of which one-third were planted on Flint river alone. The total increase of newly-planted and budded trees since the war can be scarcely less than five hundred thousand, showing a large increase in orange growing and its commerce. The trees are usually set out twenty feet apart, or about one hundred trees to the acre. Before the severe frost of February, 1835, which destroyed nearly all the orange and other semi-tropical fruits of Florida, to the ground, there were trees there of a hundred years old. There are trees in the Tuilleries Garden, Paris, that have attained from three to seven hundred years of age, and still produce large yields of fruit.

There are other semi-tropical fruits, which succeed well in Florida, and probably in other regions bordering on the Gulf of Mexico—bananas, citrons, date palms, limes, lemons, pine apples, and pomegranates; and among nuts, the almond, Madeira nut, Brazil, pecan, and Cocoa nuts. These fruits and nuts will soon, doubtless, become important articles of production and commerce.

We cite farther from Mr. DUNN's paper the following observations on the semi-tropical fruits of California: "Oranges of fine size and flavor are had in all parts of the State, ripening from November to April. The crop is a most favorable one, as the trees bear unusually full, while the fruit finds a ready sale at remunerative prices. Lemons of three varieties are grown in the southern coast district, viz.: the California, or native lemon, which is of large size, and apparently a cross or hybrid with the citron, having the thick rind of the latter with the flavor of the lemon; and the Malaga and Sicily lemons, grown in the same district, from the seed, produce unusually large and fine fruit, and bring profitable prices. Limes of unusually large size and good flavor are produced in the same localities. Citrons of unsurpassed excellence and size are to be had in the south coast district, but are as yet only valued for their perfume or aroma and beauty. It would be an easy matter for California, say in eight or ten years, to supply the entire Union with the preserved citron of commerce, if proper efforts were made to do so. The fruit is of unusually large size and perfectness. For the purpose of giving some idea of the cultivation of the above semi-tropical fruits, I give the statistics of the crop of 1866, and size of specimens brought to San Francisco: Oranges, about two hundred and fifty thousand. As many new trees have just been set, and others are coming into bearing, parties well informed in the trade estimate that the crop of 1867, unforeseen drawbacks excepted, will be at least double the above quantity, all from the vicinity of Los Angeles. For richness of coloring and flavor these oranges are not equaled by any fruits imported from the Hawaiian and Society Islands, Lower California, Mexico, Central America, or Panama. The total consumption of this fruit in 1866 was about three million. California-grown oranges range from six to twelve ounces each. Lemons of the three varieties, of which the native lemon, although of large size, is the poorest and little used, range in weight from eight to sixteen ounces each.

Fruit raised from Malaga and Sicily seed grows to an enormous size, compared with that which is imported. Specimens of the Sicily variety have been grown averaging twelve and thirteen ounces each, taken indiscriminately from boxes on sale. The Malaga variety is also of large size, but somewhat smaller than the Sicily. The crop of 1866 was about forty thousand, all from the vicinity of Los Angeles. Limes are of twice the size of the average imported fruit. Many specimens have been had this season, weighing four and five ounces each. The total crop for 1866 was about sixty thousand, which will probably be doubled in 1867, as will also be the case with the Malaga and Sicily lemon. Of citron not over four thousand to five thousand have been marketed this year. Those sent to San Francisco ranged from twenty to forty-six ounces each.

"Raisins have been made in considerable quantities in the State during the last four years. Those produced from the Feher Szagas, or Fiher Zagos grape (Hungarian), are considered by good judges as superior in every respect to the imported or Malaga fruit, with the exception of size of berry and deep bloom. The Fiher Zagos raisins are of a light red color and white bloom, of medium size, have a thin skin, tender pulp and seed, are of pure, sweet flavor, and free from the musky taste that is common in all imported fruit. This grape was brought from Hungary to California in 1853 by a native of the former country. From two small cuttings, or roots, at that time, the culture has spread until they are now probably fifty thousand bearing vines, and at least three hundred thousand cuttings and roots planted, all of which will be in full fruitage in 1870. The vine is a most prolific bearer, averaging, in the largest vineyard in the State, from thirty to forty pounds per vine, at six years of age. Prior to 1862 the grape was confined mostly to one vineyard, situated in the edge of El Dorado county, about a mile from Mormon island, a noted gold-mining locality in earlier days. In that year, E. N. BUGBY, ex-sheriff of Sacramento county, saw the grape, and, drying it, found as the result, raisins of a very superior quality. Purchasing the vineyard, he at once commenced propagating the vine. In 1863 he made the first public exhibition of raisins, and from two hundred boxes, or five thousand pounds, in that year, increased the amount to one thousand five hundred boxes, or thirty-seven thousand five hundred pounds, in 1866. The vine is trimmed—like others in

California—in the shape of a low bush or tree, the main stalk not averaging eighteen inches above the ground. The young wood is staked up to about four feet high, and the runners pinched in during the Summer so as to throw out lateral shoots, the leaves of which protect the fruit from the rays of the sun. The total crop of raisins and dried grapes for 1866 is estimated at about forty tons weight, nearly one-half of which were from the Fieber Zagos grape. As this variety is a most excellent keeper, besides its other good qualities, it is being propagated largely in all portions of the State. From present appearances, it seems probable that California will be enabled to supply the entire Union with raisins before the close of the present century."

The olive thrives well in California, and gives promise of becoming an important item of culture. The almond, the Madeira or English walnut, and pea-nuts, are largely and profitably cultivated. The hazel and other wild native nuts are quite common in the country.

SMALL FRUITS.

With the large fruits and the small, every family, especially every farmer's family—may enjoy the luxury of fruit to form a part of every meal throughout the year, for such is their complete succession with which our Heavenly Father has favored us, that we may have these healthful and delicious luxuries if we will but resolve to do so.

Said N. J. COLMAN, of the *Rural World*, in an address before the Illinois State Horticultural Society, in December, 1866: "See what a succession of small fruits is here afforded. First comes the blushing, lowly, delicious strawberry. What a gift from God was this to man! How incomparable in flavor! How highly prized by king and peasant. And yet, how easily produced. The humblest individual, with twenty feet square of ground, can enjoy them in abundance. And for a month, nearly, can we daily partake of them. Then follows the raspberry, another most delicious fruit. So many varieties of the raspberry have been introduced, some ripening earlier, some later, they can now be enjoyed till frost. The ever-bearing varieties we have seen cut down by frost, heavily laden with fruit in various stages of maturity. The gooseberry and currant succeed the raspberry, and afford a most health-

ful acid, which regulates the tone of the stomach and wards off many diseases to which we are liable in the Summer season. These are followed by that prince of fruits, the glistening blackberry, of which we can partake for a month or longer, to our heart's desire, with the greatest sanitary benefit. Then comes the juicy, luscious grape, which has received praise and admiration from all nations and ages, to which the Holy Scriptures so frequently allude, and it can be partaken of, not only during the Autumn, but during the whole Winter. By packing away carefully in boxes, they are as easily preserved as apples. And yet how few of us have a single vine of this highly admired and delicious fruit, whose glory poets sang, even before the birth of our SAVIOUR. The vine is as simple and as easy to plant and cultivate as an apple tree."

The Grape.—As far as the darkness of antiquity may be penetrated by the light of history and tradition, the grape vine was the first plant cultivated by man. The preference was deserved, for the field of choice was probably not large—the strawberry being one of Nature's delicious after-thoughts. Every man who owns a rod of land should set a good vine upon it, and give it attentive care; he will surely have his reward, not merely in the gratification of appetite and in profitable financial return if he enlarge his vineyard—but in the substantial consideration of improved health, which is better than both.

Grapes, in a small way, have long been grown in our country. In 1823, JOHN ADLUM published at Washington a treatise on the cultivation of the vine, and he not only introduced and experimented with many foreign varieties, but collected all the best native ones, and did much in attracting attention to the subject, and giving a new impulse to the culture of the grape. HERBEMONT, DUFOUR, WILLIAM PRINCE, and COXE were at work in the same cause; and, finally, the sending of a Catawba grape to NICHOLAS LONGWORTH, of Cincinnati, marked an epoch in American grape culture. In 1856 the Delaware grape was introduced, and this was a most important event, for it proved a very excellent, and popular grape, and greatly stimulated others to the development of new varieties—the Hartford Prolific, Diana, Rogers' Hybrids, Iona, Israella, and others. The demand for the Delaware, particularly, was immense, and set people to talking and thinking about grapes; and thus even the Catawba, Nor-

ton's Virginia, York, Maderia, Isabella, Concord, and even some which were so old and abundant that nurserymen scarcely thought of propagating more than a few hundred vines annually, were suddenly called for in such numbers that the scientific propagators could not produce them in sufficient quantities to meet the increasing demand. So that the call for the new and the old varieties has resulted in the growing of millions of vines, where there were only thousands ten years ago. But the Delaware, which was the immediate cause of the excitement, has fallen behind, and some of its predecessors, like the Concord; have gone far beyond it in the numbers annually planted.

The Healthfulness of Grapes.—"Every farmer," says Dr. WARDER, "every cottager, every householder or house-renter, should plant a few grape vines. It is a very simple affair, requiring no great amount of skill or labor to plant, train, or trim a grape vine, and its productiveness of fruits that everybody, young and old, can appreciate, is proverbial. Who has not heard of the famous grape cure—better than Homeopathy, Allopathy, Hydropathy, or any other pathy? Who can object to trying it? Certainly not he who has planted and trained his own vines."

This fruit is among the best and most wholesome of medicines. Its use as an article of food is much recommended in cases of consumption. Grapes contain a large quantity of sugar, the kind which most nearly resembles milk-sugar in its character and composition, which is also useful for consumptives, it having a great attraction for oxygen, and readily affording materials for respiration.

In the vineyard districts of France, Spain, and other wine-growing countries, the medical qualities of the grape are known and highly prized. Ripe grapes have cured epidemic dysentery; and in vine countries they speak familiarly of the "grape cure." The free use of this fruit has a most salutary effect upon the animal system, diluting the blood, removing obstructions of the liver, kidneys, spleen, and other important organs, giving a healthy tone and circulation, and generally augmenting the strength of the animal economy. In diseases of the liver, and especially in that monster compound affliction, dyspepsia, the salutary and potent influence of the "grape diet" is well known in France.

The inhabitants of the vineyard districts are never afflicted with these diseases, which fact, however, alone would not be conclusive evi-

dence of the medicinal qualities of the fruit of which they freely partake, since peasant life is rarely marred by this class of ailments, but hundreds who are thus afflicted, yearly resort to the vineyard districts for the sake of what is known as the "grape cure"—and the result proves to be a cure, except in very long, protracted, and inveterate cases, which are beyond the reach of medicinal remedies. The invigorating influence of the ripe grape, freely eaten, upon the feeble and debilitated, is very apparent, supplying vigor and the hue of health in the stead of weakness and pallor, and this by its diluting property which enables the blood to circulate in the remoter vessels of the skin, which before received only the serous or watery particles. These remarks apply to the fruit when perfectly ripe—when unripe, like all other unripe fruits, it deranges the digestive organs, and those dependent upon and sympathizing with them.

How to Eat Grapes.—Few people know how to eat grapes. Some swallow pulp, seeds, and skin; others swallow *only* the pulp, ejecting both seeds and skin. Dr. UNDERHILL advises that it would be well to observe the following rules, namely: When in health, to swallow *only* the pulp—when the bowels are costive and you wish to relax them, swallow the seeds with the pulp, ejecting the skins. When you wish to check a too relaxed state of the bowels, swallow the pulp with the skins, ejecting the seeds. Thus may the grape be used as a medicine, while, at the same time, it serves as a luxury, unsurpassed by any other cultivated fruit. A man or woman may eat from two to four pounds of grapes per day with benefit. It is well to take them with, or immediately after, your regular meals.

The Importance of Grapes.—There is no doubt, says the *Country Gentleman*, that by the next twenty years, the grape will be universally admitted to be second only to the apple in its importance to the American people—referring simply to its uses as a fresh fruit only.

There are now a large number of new grapes raised both by cross fertilization and otherwise, that promise to extend the period of ripe grapes to a greater length than at present. That period is now only preceded by the apple and pear. The apple now reaches through the whole yearly circle. The pear ripens from midsummer till Spring; but it is hard to get good pears much later than the first of the year, while grapes are kept as easily as Winter apples, although in a different way. The peach,

in the North, continues to ripen scarcely two months at the farthest—the plum about the same—while neither will keep long in a fresh state. The hardy grape will yet give us a delicious fruit, remarkable for its wholesomeness, in unlimited quantity if we desire it, scarcely if ever failing with seasons—not less than eight out of the twelve months of the year. The “grape fever” will not, therefore, subside quite yet.

The Productiveness and Profit of Grape Culture.—WILLIAM S. CARPENTER stated in the *Gardener's Monthly*, that it was possible to make an acre yield ten tons of grapes, which at fourteen cents per pound, would make \$3,000, or at seven cents per pound, would realize \$1,500. The editor of that journal fully corroborates this statement, saying that there are 43,500 superficial feet in an acre; and a vine trained to a single stake can be grown upon four feet of ground, or ten thousand vines per acre, which at two pounds per vine would yield ten tons. We doubt if this extreme yield will ever be practically realized; though there it is certain that a vineyard properly cared for, in a section adapted to the maturity of the grape, will yield a far better profit than any kind of grain.

WILLIAM H. MANSFIELD, of Waterberry, ever be practically realized; though it is certain that a vineyard properly cared for, in a at from thirty to forty bushels. It is trained fourteen to sixteen feet wide, and eighty feet long. There is a famous vine at Santa Barbara, California, now sixty-five years old, trailed over eighty feet in circumference, with a trunk twelve inches in diameter, rising clean fifteen feet from the ground. Some years it has borne six thousand bunches of ripe sound grapes, or nearly eight thousand pounds, and has become the wonder of even that wonderfully prolific country. There was near Peoria, Illinois, a few years since, a vine which measured forty-one and a half inches in circumference. The late A. J. DOWNING said that he had seen an Isabella vine produce three thousand clusters in a single year.

The extent and progress of the business of grape growing is shown by statistics, from which it appears that not less than twelve thousand acres of vineyards were set in the State of Ohio at the close of 1867, of which about one-fourth, or three thousand acres, were planted within the years 1866 and 1867. About one-half of the whole area is located in what is termed the Lake Shore district, and

the rate of increase is greater here than in the other parts of the State, and the amount of product per acre of the bearing vineyards is also greater, as shown by the assessors' returns.

The following statistics of the vineyard products of 1867, of the islands and region around Sandusky, were presented by Mr. LEWIS, at the Lake Shore Grape Growers' Association, in February, 1868, as the result of very careful inquiry:

Pounds of Table Grapes shipped from Sandusky	1,822,000
Wine Grapes	200,000
Wine Grapes pressed	4,000,000
Total Grape Crop of 1867, (3,341 tons,) lbs.	6,022,000

Wine pressed from the above on Kelley's Island, Bass Islands, Peninsula, and at Sandusky, 400,000 gallons. Brandy manufactured, 1,500 gallons. The average price realized for table grapes was 12½ cents per pound; for wine grapes, 6 cents. The wine is estimated to be worth \$1 25 per gallon, and the brandy \$5, so the cash value of the crop stands thus:

Value of Table Grapes, 1,822,000 lbs., at 12½¢	\$227,750
Wine Grapes sold, 200,000 lbs., at 6¢	12,000
Wine, 400,000 gallons, at \$1 25	500,000
Brandy, 1,500 gallons, at \$5	7,500
Total value of crop	\$770,250

As near as can be estimated, the yield per acre of bearing vineyards, in fair condition, averaged two tons per acre, making in value, two hundred and twenty-seven dollars per acre as the average. The great bulk of the grapes were of the Catawba variety, though a few others were produced for both table and wine.

A correspondent of Kelley's Island, writing about the grapes of Lake Erie, in 1868, says: “To secure a good crop the ground must be well plowed, cultivated and hoed, keeping it free from all weeds and grass. The price of grape land is three hundred dollars per acre, and when a vineyard is in full bearing, after a few years' growth, it is worth one thousand dollars an acre. The average net profit from one acre of grapes is three hundred dollars, but as high as eight tons of grapes to the acre have been raised—which, at the low figure of eight cents a pound, brings the snug little sum of one thousand two hundred and eighty dollars. The Concord, Delaware, and Catawba are the grapes raised here. One thousand acres of grapes are now in training, mostly on North Bass, Middle Bass, or Put-in-Bay, and Kelley's Island, which together contain about six thousand acres. Immense quantities of pure native wines are also made on these islands; the amount last year was one hundred thousand gallons.”

GEORGE HUSMANN, of Missouri, speaks of fifteen tons from an acre, or enough grapes to yield, if pressed, 2,500 gallons of wine. This is clearly an exceptional case. The evidence is that, as a rule, the Concord yields from five to eight tons per acre. Eight tons of Concord grapes have been raised on an acre in Massachusetts, and six tons is an average crop from vines five or six years old. Concord grapes sold at Boston, in 1864, at from twelve to twenty cents per pound, Isabellas at twenty-five cents, Dianas at thirty, and Rebeccas at forty; while Delawares were selling that year in New York at from forty to sixty cents a pound. At a meeting of the fruit growers of western New York, at Rochester, in 1859, no cultivator gave in a return of less than five hundred dollars as the result from an acre of grapes, and in some cases profits of from one thousand to fifteen hundred dollars an acre were reported. One grape grower in western New York, during a period of six successive years, raised an average of nearly six thousand pounds from an acre, which at fifteen cents per pound, brought nine hundred dollars a year. He considered three cents a pound as covering the expense of manual labor and interest on investment.

Take the empire of France, which produced in 1868, 1,100,000,000 gallons of wine, and which seldom falls under 830,000,000, where grapes sell for two cents a pound, and where the wine pressed out of the grape at the vineyard is taken at twenty-five cents a gallon, to be ripened in due season; and then take the returns of the Minister of the Interior, in regard to the average value of the grape crop per acre, and we find it reaches one hundred and thirty-four dollars. Even at that low price, we can see it is more profitable than the ordinary husbandry of our country.

The grape crop of the United States is steadily on the increase. "But we have not yet got a grape apiece for our population," said Hon. M. P. WILDER, in 1868—"certainly not a bunch." Though this may be somewhat underrated, yet it is true that probably not one in a hundred of the farmers and laboring people of our country enjoy the luxury of the cultivated grape. California, in 1866, had some 30,000 acres of grapes in bearing, and fully 50,000 in 1868; Ohio, in 1866, had 12,000 acres; and it is doubtful if, at this time, there are to exceed 150,000 acres in bearing in our whole country. Mr. F. R. ELLIOTT, at the close of 1867, estimated the amount of land in vineyards very much higher, and allowed the crop

to have averaged two tons to the acre. In Ohio, the average of bearing vineyards was about two tons to the acre in 1867; but in California, and some other sections, the yield was doubtless much larger, taking one year with another.

Propagating Grapes.—We are indebted to the *Country Gentleman* for the following account of raising grape plants, designed for those who are inexperienced in the business, and who may wish to raise them for their own use. Layering will be found to be the easiest mode of propagation.

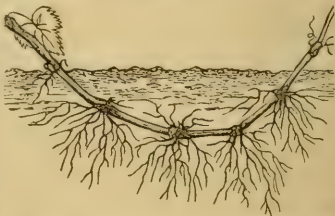


FIGURE 1.—GRAPE LAYER, THE ROOTS FORMED.

Taking layers from bearing vines always injures them more or less by exhausting their vigor; but one or two may be taken every other year from a very strong young vine that is allowed to bear but little. Two different times in the season are chosen for doing the work—Spring and early Summer. The latter is usually the most convenient. As soon as the new shoots have grown some feet in length, and have ceased to be soft in the wood—generally not far from the end of June—dig a depression or hollow under the shoot near the middle, so that it may be bent down into it, and buried with three or four inches of soil, leaving the part next the parent vine, and also the growing end, uncovered. If the weather becomes dry, mulch the surface to keep the earth moist. Young roots will be thrown out from each joint, and by the termination of growth in Autumn, every layer will have a copious supply, as indicated by Figure 1. If the soil has been kept moist, and the shoots are fairly vigorous, this mode of obtaining roots will never fail, and is therefore just the thing for new beginners who wish to propagate but few plants. After the leaves have dropped in Autumn, the above layer is severed from the parent vine, taken up, and cut into well-rooted plants.

To propagate on a larger scale, select good layers from vines usually of two or three years'

growth, of sufficient size and vigor; and during this period, they should be cut back and trained to about two shoots. Then select for the layer, a shoot or cane eight or ten feet long, cutting all off save six or eight of the buds nearest the root. Bend the cane down just as the new shoots are starting, and place it in a trench of about five inches deep, and fasten it by pegs or stones, and cover with good compost, as represented in Figure 2:



Figure 2.—SHOOTS SPRINGING FROM A LAYERED STEM.

Caution is necessary not to apply the earth or compost too early nor too high up on the young stems, which might cause the rotting of the soft wood; dampened moss laid over the layer awhile answers a fine purpose, and then apply the earth or compost. Some of the shoots will outgrow others, and should be pinched back, so as to equalize the growth. If any appear feeble, they should be pinched off, and give additional growth to the others. These new plants will soon become well-rooted and should be taken up, separated as represented in Figure 3, and heeled in or covered with earth for the Winter; some protection from freezing being afforded by covering the surface with manure or leaves; or they may be packed for the Winter in boxes of damp moss in the cellar; or even left in the ground where they grew, covered with litter, to be taken up, separated, and transplanted in the Spring.

While these new plants are forming from the layered cane, one, two, or three shoots, according to the strength of the plant, should be trained to a stake for the next season's work, the cane having been properly cut back for this purpose.

To propagate by cuttings the cuttings should be taken from shoots of one year's growth, of full medium size, usually about seven or eight inches long, each one having two or more buds. Where the Winters are severe, the cutting should be made late in Autumn, packed in slightly moist earth, or, what is much better, in damp moss in boxes, in the cellar. In mild climates they will keep well by being placed in

a bed in Autumn, and covered with a thick coating of straw, manure, or leaves.



Figure 3.—NEWLY-FORMED LAYER PLANT.

These cuttings should be planted in the Spring, in a trench, as represented in Figure 4,



Figure 4.—MODE OF PLANTING CUTTINGS.

nearly perpendicular on one side, and sloping on the other, standing about three inches apart, so that the upper bud shall be about an inch above the level surface. Fill the trench to the upper bud with rich, mellow soil, pressing it with the foot around the cutting, leaving it more loose and mellow toward the top. Some cultivators are more successful by covering the surface with an inch or two of fine manure for the retention of moisture in the soil.

A New Mode of Propagating Grapes.—A. TOWNSEND, of Oconomowoc, Wisconsin, gives the following as his experience in growing grapes: "Propagate your vines in lattice boxes or split baskets, holding three pecks. Have them nine or ten inches deep; layer ripe, vigorous wood, of last year's growth that did not fruit; do not allow them to strike root too soon, or the mother vine will rob the new plant; for as soon as cane wood is changed to root, the flow of sap is reversed and flows toward the mother plant. Vines grown in this way receive no check or shock by being removed to garden or vineyard, because the earth in which they grew is not removed from the roots, leaving them as nature planted them

(no human hand can do it as well). If well propagated, they are as well able to bear fruit the first season as the best of vines from cuttings in the third or fourth year, and are sure to produce large clusters and berries. One such vine is worth ten of the best cuttings' plants; for it does not need watching and nursing for three or four years, as it is able to take care of itself. Every man should grow his own vines.

Root Grafting.—This mode may be briefly alluded to, as one extensively adopted for propagating on a large scale. It is done early in the Spring by taking a portion of the shoot



with one bud, as shown in the annexed figure, and inserting a piece of root, cut wedge form, into a cleft in the lower end of the cutting. Grafting plasters bind the parts together, but they are left open below for the emission of roots. The Figure (5) represents more fibers than are desirable at first, or when the work is performed. Varieties which furnish long and smooth roots, are most convenient, of which the Concord is one of the best. The

FIG. 5.—ROOT GRAFT. grafts should be cut in the Fall, and kept fresh in the cellar till wanted. By the last of May, or early in June, the vines will be in full leaf; then is the time to engraft, as they will not bleed.

Soil and Location.—The soil for the vineyard should be light and warm—one largely composed of clay is preferable; sandy, gravelly, or loamy soils have, in some localities produced fine grapes. The soil on Kelley's Island, and about Sandusky, Ohio, is chiefly a black, peaty loam, of moderate depth, resting on a thick stratum of stiff clay, underlaid with limestone. The most successful vineyards in our country have been those on limestone soils, as those in the Ohio Valley.

In an address by Dr. KIRTLAND before the Ohio Horticultural Society, in 1867, upon the grape soils on the southern border of Lake Erie, that eminent fruit grower made suggestions of general application. The analysis of Professor EMMONS of the wood and bark of grapes was read, and Dr. KIRTLAND said that according to Professor LIEBIG's theory, no vegetable growth could be had on soil in which

any element found in the vegetable was absent. Grapes, therefore, could not be grown on any soil which did not possess all the elements found in the vine by such analysis. Dr. EMMONS found in ashes of the grape vine about twenty-five per cent. of potash, thirty-five per cent. of lime and phosphate of lime, a little chlorine, soda, sulphuric acid, silicic acid, iron, and magnesia, with thirty-five per cent. carbonic acid. In the fruit, the percentage of potash and sulphuric acid is much larger than in the vine.

The soil about Cincinnati had enough lime and potash to sustain grape vines for a few years; but after some years' cultivation the vines began to show signs of starvation. Then mildew or some other disease attacked the half-starved vines. On new land, the healthy vines might have resisted the attack. "There are places—some of them in this vicinity," said Dr. KIRTLAND, "where the grape vines will last after we are dead and gone. There are others where a few years will see the vines growing sickly and unprofitable, and dying."

The soil about Cleveland contains plenty of lime; he had found a bed of plaster of Paris on his own farm. Every one hundred pounds of the shale of the lake shore contains from seven to fifteen pounds of potash in the mica, which forms about half of the shale. Chloride of sodium (salt) was found in the old deer licks all along the lake shore. Sulphur plays an important part in the nourishment of the grape, and it is found here in great quantities—so much that it is now contemplated in this city to get sulphur from the shale of the lake shore, instead of importing it, for making sulphuric acid.

Of underdraining in clay land, he said such land should not be touched until perfectly underdrained—the drains sunk three or four feet, and not more than thirty feet apart. This converts the clay land into a vast absorbing surface, to receive ammonia and gases. This is the way the Dover Bay lands are prepared, which some years ago were worthless, almost. Now, they are among the best for grapes to be found, and they will be permanent. There is but one soil—the clay soil—for grapes. If you have sandy land, put on a dressing of about two inches of broken shale.

From Professor EMMONS' analysis of the grape vine, any one moderately conversant with the components of soil can readily see what is required for his vines, burying the refuse cuttings and leaves, sprinkling on plaster of Paris, sup-

plying freely the soap-suds and wash-water of the family, with animal manures and wood ashes, aside from the specific application of potash and bone dust.

A clay soil, says F. R. ELLIOTT, sufficiently light and fertile to grow good corn, and with a good supply of lime and potash (which can be applied if there is a deficiency), is capable of producing grapes of the best quality; if intermixed with gravel or shale, it is all the better. If the water does not shed naturally, the soil should be well drained.

Most fruits require more or less of the potash salts, as is shown not only by a chemical analysis of them, but by the fact that their health and productiveness are promoted when they are manured with ashes, or when the soil they grow in has received the emptyings of the wash tub, particularly if soap made from ashes has been used in washing. Of all fruits, no one kind is, perhaps, as great a potash feeder as the grape, therefore the soil for a vineyard ought to contain the potash minerals. By going to the original source from which all plants have derived this substance, we will be enabled to save the expense of purchasing a costly article. The principal potash minerals are *feldspar* and *mica*, and these are mainly contained in granite, gneiss, and mica slate. Soils, therefore, that are derived in a good measure from these rocks are the richest in potash, and therefore, other things being equal, the best for vineyards.

Judge J. G. KNAPP, of Wisconsin, expressed the opinion at the meeting of the Wisconsin Horticultural Society, in February, 1869, that there is a great want of salt in the grape soils. In New Mexico, where he resided several years, and in California, where they have a soil more impregnated with saline properties than in any other country except Persia, which possesses just such a soil—some of it so salt that corn will not grow—there they produce grapes and quinces in the greatest perfection. "The grape robs the soil of more salt than any other plant except the cabbage."

At a late meeting of the Pennsylvania Fruit Growers' Society, Mr. MEEHAN, the noted horticulturist of Germantown, launched the following dogma concerning grape land: "To have good success, a soil could scarcely be too warm, too dry, too shallow, or too rich." The enunciation of this radical platform occasioned some surprise; but not more so when it was found the experience of nearly all the speakers confirmed it. Rev. Mr. COLDER said that at Harrisburg, his Concords on low land did

poorly; on dry land they did well. Mr. KESSLER found just the same experience at Reading. Mr. REIST reported the same of Delaware grapes in his vicinity. The best Clintons Mr. KESSLER ever saw were grown on an old stone heap. Dr. GROSS did not approve of shallow soil, but found it best not to dig deep, but to fill up on the surface. Mr. HILDRUP, of Harrisburg, has had great success by planting on a very dry soil well enriched with stable manure; he had made last year fifty gallons of wine from four hundred vines. Others gave similar experience.

The location of a vineyard is important—it should be exempt from late Spring and early Fall frosts. In Italy and in Sicily the very finest and sweetest grapes grow on the rocky rubbish of volcanoes, and those that grow on loose rocky soils or along hill-sides covered with rocks, are often the best. These facts ought to teach us not to select the richest soils, and not to stuff them with organic matter.

The past season, says the *American Journal of Agriculture*, was a very peculiar one—wet and cold; and the grapes in many localities in the East failed to ripen. While this was generally true, it was rather refreshing to observe at one of our horticultural exhibitions, splendid specimens of a well-known variety, apparently fully ripe, which we found, on inquiry, had been grown near a ledge of rocks. Some years ago we visited a place where we observed similar results from a similar cause. The whole secret of the thing is that the rocks absorb the heat of the sun by day, and give it off at night; keeping the roots of the vine warm, and the temperature about it more fully equalized.

Our attention was once attracted to this same subject by observing that the melon vines in a hill, around which some stones had been placed, were much larger at the end of a few weeks than those in the hills that had not been so treated. The same principle is observed in cities, where grape vines are trained in front of brick walls, which absorb the heat by day, and reflect it when most needed by the vine. We propose to test more fully the value of such treatment for the vine, by placing stones about the roots of several bearing vines, in different parts of the vineyard where they failed this year to ripen a single grape.

The finest Concords we ever saw, said J. F. C. HYDE, in his address before the Massachusetts Agricultural Society, in 1863, were raised in Waltham, beside ledges of rocks, where they had the benefit, not only of shelter from cold

winds, but the direct and reflected heat by day, and the warmth evolved from the rocks at night. Few persons who have not tried the experiment have any just idea of the advantages to be derived in this climate from planting grapes beside rocks where the vines can have "warm feet."

An elevation of only a few feet will often be the means of saving the entire crop. Elevated positions, with a free circulation of air, for warm climates; and elevated, protected ones, for a cold latitude, with a Southern slope, is always preferable, and sometimes indispensable. Trenching will be necessary on gravelly hill-sides. Deep trenching is not advisable in New England, or elsewhere, where the soil does not get heated, during the short Summers, sufficiently for the healthy growth of the grape, to a greater depth than one foot; if, therefore, the roots of the vine are coaxed down into the lower cold stratum of soil, the wood and buds are not properly ripened, and the next year's crop will be enfeebled and ripen later. In portions of the West and Northwest, where the rainfall is less than the evaporation, deeper trenching seems essential.

But we must never lose sight of the fact, that the grape needs much heat to insure its perfection. "If we can ripen the grape in August," says Mr. BULL, of Massachusetts, "we get rid of the pulp. That is no longer a problem. I have done it. I have grapes without a particle of pulp, and of great delicacy of flavor, which ripen in August; but I have not a late grape which does not have some pulp; and this year (1867), which was cold and wet, the Concord had more pulp than I ever saw before. The pulp melts away, in other words, in those climates where the season is long enough to ripen it to perfection, and where Nature is no longer put to the expedient of surrounding the seed with it to accomplish her purpose of reproduction. The Concord grown at Jacksonville, Florida, has no pulp at all, and is of exquisite quality, and more agreeable to the taste than the Hamburgs grown there." Then, when we at the North shall have grapes early enough to ripen in the *heat of the season*, at a time when the climate is like that at Jacksonville, they may attain the same quality here.

WILLIAM SAUNDERS says, that he holds two undeniable facts in grape culture: 1, That the best fruit is produced on the strongest and best ripened shoots; and, 2, that the shoots produced from spurs never ripen so thoroughly as those from terminal buds. Further, that prop-

erly ripened fruit will never be produced from unripened wood. Fruit apparently well colored, may be seen on green growths, but such fruit does not possess the characteristics of a well-ripened bunch of grapes.

Planting.—Grapes may be set out in the way-places, trained to a stake or trellis, or be made to climb beside the walls of out-houses, covering their bare sides with foliage and fruit. Plant in the Spring or the Fall—the latter has many able advocates—if early in the Fall, strip off every leaf, set in holes five or six* inches deep, spreading out the roots carefully in their natural position, and covering lightly with good soil. Mulch your ground; and to every vine put down a small stake three or four feet long, to which to tie the vine during its first year's growth. If planted in the Fall, hill the rows up as you would corn, covering the vines entirely, otherwise the ground will settle around your vines and form a basin, which will hold too much water, and injure if not destroy the vines.

Clip the roots to prepare them for planting, leaving none over fifteen or eighteen inches, because it is important to get fibrous roots started near the main trunk. In planting, if in Autumn, set the roots about five inches deep, leaving the cane a foot or two long, which should be cut away in Spring level with the earth. Grow but one cane the first year, which—of strong growing sorts—will reach ten feet in length. Cut this cane down to four eyes in November, and allow the two lower ones to grow next Spring, and train them upright. These two canes are to be cut back in November to about five feet, and next Spring are to be bent down in opposite directions, and each shortened to four feet and tied to stakes or wires, or slats of a trellis, to grow fruit-bearing canes. Plants being set just eight feet apart, the ends of the arms from each will meet and fill all the space. If the vines are of the short-jointed varieties, every other bud may grow, and every one upon long joints, thus giving five or six uprights to each arm. The third year from planting, each upright may ripen two bunches, say twenty-four bunches to a vine. Next March cut back each upright to two buds and grow two canes. Afterward cut the upper one of these two, and so on of others, entirely away, and cut back the lower two buds, which

*Some of the experienced grape growers of the Northwest contend that plants must—whose roots can be put down deep—be fully a foot from the surface, and then they will not get killed so easily by the cold. For this climate, say to 7, give six plants from long cuttings first—next No. 1 layers.

are to grow two canes. This keeps the bearing wood down to a low head, the arms being trained to any height desired. A well established vine will produce fifty to seventy-five bunches a year upon a trellis only four feet high, which allows rows to be set six feet apart, or nearer, upon very valuable land. Some prefer arms three feet long, and two tier of trellises.

Some discretion must be used as to the distance apart with which to plant the vines, having reference to the kind of grape to be planted. If dwarfish varieties, such as the Delaware, Diana, or Rebecca, four by five feet is a good distance; if Norton's Virginia seedling, Concord, and other large kinds, eight to ten feet is not too far apart. An experiment in planting Concords only four feet apart, resulted in lessening the size of the fruit about one-half, but the loss was fully compensated in its greatly improved richness and flavor.

Summer Pruning.—Grape vines must be pruned to get a fruit that will not shame its cultivator. Pruning in the Spring, when the vines bleed, is injurious; if done in the Autumn, some contend that the vines do not bleed, but the wound soon dries up and hardens over, while others declare that if the sap is not permitted to escape, it returns to the roots, causing them to rot—but experience does not confirm this rotting theory. Autumn pruning, however, induces a superabundant growth of wood the following season. Moderate pruning in midsummer tends to check this overgrowth.

Judicious Summer pruning, says Dr. WARDE, is indeed one of the most important operations to be practiced upon the grape vine. Undoubtedly, it has been much abused, and when improperly practiced it has produced disastrous results; but it is not right to make Summer pruning the scapegoat upon which to saddle all the evil results of climate, incompatibility of the soil, and other circumstances and abuses which have caused failures of the vine. A judicious Summer pruning will produce increased vigor in the shoots, and improved size and quality of the fruits which are left, so that there results a stronger not a weaker plant, and the next year's crop of fruit is often much increased by this kind of judicious Summer pruning. This treatment, however, is to be judicious and seasonable, and is to be performed, not rashly and blindly, but in a proper manner, guided by skill and based upon simple physiological laws, done with the thumb and with the finger-nail, and not with the pruning-hook,

nor with the grass-knife, by cutting and slashing, which has well been styled "Summer slaughtering." When this is done at midsummer, after the plant has expended its strength in making all this growth, before the reflex action of the vine and its roots has been fully performed, it must indeed be a debilitating process; but this is not what the careful *vigneron* means by Summer pruning. On the contrary, he endeavors so to time and so to perform his operations as to spare the vine any such loss; to this end he begins the process very early, by rubbing out the superfluous shoots with his thumb, so soon as he can discover which it is desirable to preserve either for fruit or for wood. At the same time he begins the pinching process upon all bearing fruits that may have extended beyond the last bunch of grapes, and reached the length of about six inches. The effect of this kind of pruning is marvelous.

The *Gardener's Chronicle*, of England, states that vines pruned in September—which is reckoned as one of the Summer months in that country—while the leaves are on, will have the effect of ripening the succeeding crop fifteen or twenty days earlier than other vines pruned in November, all other circumstances being equal. Several years experiments have produced the same results. In relation to this singular effect of early pruning, the *Gardener's Monthly*, another able English horticultural magazine, says that the fact has a particular value to the American grape grower, from the circumstance "that a few days of earliness is of immense importance to him, not only in getting his grapes to market, but in getting grapes in localities where the season is too short to ripen some desirable kinds, or, indeed, any kind at all. If early pruning is to hasten maturity in this way, there are very few localities in the Union where the delicious Maxatawney will be too late to be worth growing, and so of other things besides grapes."

Very much has been written, says the *Horticulturist*, on the subject of Summer pruning of grapes, the pith of all being that it is desirable to have as little extra wood as possible, and yet maintain a healthy growth of vine and maturation of fruit.

Prune always, said Mr. HYDE, in November, if possible, and lay down the vines, unless, like the Concord, they are very hardy. Always avoid severe Summer pruning, which has a tendency to check the growth of the vine, and induce disease.

My experience, in almost every respect,

said Mr. BULL, of Concord, corroborates Mr. HYDE's views—that too close planting, too close pruning, and Summer pinching, are pernicious to the grape, and that to avoid mildew and blight, and other grape diseases, you must give them room according to their strength. His position is, that the American grape, the hardy grape, must have extension; and he has adduced the fact that vines growing in apple trees grow vigorously, and give hundreds of pounds of grapes. In the town of Woburn grows a grape vine which covers the whole front of a house, which bore, in 1866, eight bushels of perfectly ripe grapes.

Hovey's Magazine gives substantially the following general rules for grape pruning, after recommending grape growers to be free in the use of the knife, followed by the remark, that where one vine is pruned too severely, nine are not pruned enough.

1. No shoots should be nearer than one foot of each other.

2. Prune back to within one eye of the old wood, every Fall and Spring, about one-half of the usual shoots—the remaining eyes producing canes to be retained for bearing next year—when the old bearing wood is in turn to be cut out, to make room for new shoots.

3. Disbud or rub off, as soon as they appear, all shoots not wanted as bearing wood.

If Fall pruning be practiced, let it be done immediately after the gathering of the fruit.

Whatever mode of training is adopted, says the *Country Gentleman*, the following general rules should be observed:

1. Allow no shoots to grow nearer than about one foot of each other.

2. Cut back each bearing shoot at the close of the season to one strong eye, as near the old wood as practicable, to produce bearing shoots another year.

3. Rub off as soon as they appear, all shoots not wanted.

These rules may be observed for different modes of training, whether vertical, horizontal, or in the fan form; but the following will commonly be found the simplest and easiest in practice:

After the two canes have been formed the third year on the young vine, they are to be cut off to within about four feet of the base, and spread out in opposite directions horizontally, to form the arms. As buds always tend to break into shoots soonest, when bent back from an upright position, and also from the

extremities or tips of the canes, these arms, if brought out straight as in Figure 6, will produce



Figure 6.

shoots irregularly, the buds on the middle portion of the arms not breaking at all, while the others may have grown several inches. To prevent this difficulty, bend them in curves, as shown in Figure 7—the middle portions being the highest, will strike shoots equally with the other parts. As soon as these shoots are well under way, the arms may be brought into a



Figure 7.

straight horizontal position. If trained to the vertical wire trellis, each shoot should have its appropriate wire, and all others rubbed off. If the horizontal wire trellis is used, each shoot should be tied to the second wire as soon as they have grown sufficiently to reach it. This wire being placed nearer the base for this purpose, when the young shoots have reached a few inches above the top of the trellis, they



FIGURE 8.—BEARING VINE.

should be kept pinched back to this height for the rest of the season. Each one will probably set two or three bunches of fruit, and if the canes are strong enough, these may be allowed to remain and ripen, and will present in Autumn the appearance shown in Figure 8.

If the vine is intended to be laid down and slightly covered for Winter, the pruning may be done at any time after the fall of the leaf. Or, if it is desired to use the wood that is cut away for propagating new vines, the pruning should be done before the shoots are severely frozen. As all pruning in Autumn increases the liability to injury by the cold of Winter, one or two extra buds should be left on the

slump, to be cut down the following Spring. If the pruning is not done in Autumn, it may be performed at any subsequent period before Spring.

Grape Trellis.—The wire trellis is very largely used, both in this country and Europe—the size of the wire preferred is No. 16, and but two wires are generally used, except in cases of very large vines, in which three are used, and sometimes four. They are stretched on strong posts set twenty feet apart, passing intermediately through holes in smaller posts or stakes. On the lower line, about eighteen inches above the ground, the fruit-bearing wood is trained, while the upper line, about eighteen inches from the other, supports the new wood. Many in Europe prefer to allow the fruit-bearing cane to do service two years, instead of one only, as is the practice in America. There is no doubt that with wire trellises the pruning, tying, pinching off, etc., can be much more cheaply done than where the training is to stakes; and from the way the clusters depend from the horizontal cane, it is easy to see that there must be also a superior access of sun and air, and a greater ease in gathering the fruit.

Another mode of wire trellising, somewhat different from the preceding, is as follows: At each end of the row, say one to two hundred yards apart, a chestnut post, eight inches diameter, is planted four feet in the ground, and six or seven above. The intermediate posts are not quite so large, and not always so deeply set. They are of the same durable timber, and will last thirty years or more, probably. They are set from eight to fifteen feet apart, supporting three lines of No. 11 wire, attached by nails. The first wire is three to four feet from the ground, and the space above equally divided—some lines of posts being seven feet high. The cost of posts averages about twenty cents each, and trellising an acre, \$250 to \$300.

A. S. FULLER suggests that the cheapest and best way to make a trellis is by nailing two light slats to light posts, very much as you would for making picket fence—one near the top, and the other a foot from the ground; then place light upright wires between the slats at each cane, fastened by winding the ends around the slats—these wires should be galvanized; they cost from three to five cents per pound more than the common annealed wire, but their lasting qualities are so much greater that it fully compensates for the additional expense. Nos. 14 and 16 are large enough for the perpendicular

wires on such trellises as described; Nos. 8 and 10 are the sizes used when put on horizontally. The number of pounds of wire required for a given length of trellis may be readily ascertained by calculating the number of feet necessary, and then dividing the amount by the number of feet in a pound, which is as follows: No. 8, thirteen feet to the pound; No. 10, twenty feet; No. 12, thirty-three feet; No. 14, fifty-four feet, and No. 16, one hundred and two feet.

The posts to be used in such a trellis should be of durable wood, of from four to six inches in diameter, and six and a half feet long; set them in the ground two and a half feet, and in a line with the vines, and eight feet apart—that is, if the vines are that distance apart; a post should be placed between each two vines at an equal distance from each. Then nail on the strips, two and a half or three inches wide, and an inch thick.

With tender sorts, which it is desirable to lay down for Winter, this process would be to incline a single arm at an angle of forty-five degrees, and spur prune, as in the double-arm system. They can be readily laid down and covered in Winter.

Dr. JADEZ FISHER, an experienced cultivator of Massachusetts, thus describes his trellis, built of posts and wire. The posts were chestnut, two by two, except one at each end, which was three by five, and braced in a foot. The posts were set ten feet apart, two and a half feet deep, and were dipped in gas tar before setting. I would now set them but six feet apart. Four strands of No. 12, annealed, iron wire were attached to the posts by staples made of the same wire. The lowest wire is eighteen inches from the ground, and the others are placed at distances of fourteen inches, so that the top wire is just five feet from the surface of the soil. These wires are coated with Paraffine varnish to keep them from rusting.

J. II. GREENMAN described the following bow trellis at the meeting of the Wisconsin Horticultural Society, in February, 1869: Prepare stakes four feet long, and two inches or more in diameter; sharpen one end, and coat with coal tar half way up. Drive a small staple, near the top, on each side, making four staples to each stake. The bows may be riven as for hoops, or sawed an inch wide by half an inch thick, and sixteen feet long. These are steamed and bent on a half circle of seven feet; the ends are sharpened to fit in the staples in the stakes. Drive the stakes eighteen inches deep,

and two feet in advance of each vine. Place one end of a bow in the first stake in the first row, and the other end in the second stake in



Fig. 9.—Bow TRELLIS.

the second row, and so alternately, the bows crossing each other centrally between the rows. In this way the grapes may be cultivated with a horse, while the foliage is in the sun, and the grapes constantly shaded.

The use of a stake driven in the ground beside the vine, with one or two slats or arms nailed across, so as to extend some two feet or more each way from the post, is a very common and cheap mode of training the vine; but a good trellis, as soon as one can be secured, is far better and cheaper in the end.

Spiral Training.—Dr. HULL, one of the most successful fruit growers in the West, says:

"The object of spiral binding and twisting the grape vine is to so place the buds that no two shoots emanating from them shall be compelled to compete for light or air. Set a stake close to the vine. Around this twist and bind spirally the fruit cane, and secure it by tying firmly at the top; if the work has been skillfully done, the young shoots emanating from the fruit buds may at the time the second pinching is performed, be bent out horizontally so as to fully expose each leaf to the sun. The canes for the next season's crop of fruit are trained to a second stake, set in the row about two feet from the vine. Should the vine be a strong one, then a third stake is to be set on the opposite side of the vine, to which one or two more young canes are to be trained. In pruning the vine, cut away the cane that produced the last crop of fruit; select the best young cane for fruit; cut this for the next season's crop to ten or fifteen buds according to strength, twist and bind to the central stake as before described. Also cut the remaining canes back to one or two buds each, and the young canes from these are to be tied to the outside stakes as before described. The treatment will be the same each succeeding year."

Manure and Culture.—"I prefer," says A. S. FULLER, "barn-yard manure, composted with two parts muck to one of manure.

This compost, for sandy soils, is as good a manure as has ever been invented. For a heavy loam or clay soil, the order might be reversed, and two parts of manure to one of muck, always adding one or two quarts of bone dust to each vine at the time of planting." Fresh manure will often cause disease and feebleness in the vine; and soils too highly manured, and rich river bottoms, will produce mammoth vines, with diminutive worthless fruit. Another recommends, that in putting out a young vine, open a large hole, and in filling it up, mix in from a peck to half a bushel of bones, with half as many ashes—the latter forming lye, and aiding in the decomposition of the bones.

E. W. BULL, in some remarks made at a meeting of the Massachusetts Board of Agriculture, in December, 1866, contended that a moist rich soil is not a suitable one for the Concord grape, but that a poorer, dryer soil will better insure a fair crop of well-matured grapes. "I have a little vineyard," said he, "on the top of a hill, which is a gravelly loam, charged with some protoxide of iron; during the whole time it has been in my possession, for twenty-nine years, has never had manure but once, and that was given to the crop preceding the planting of the grapes. I did not, at the time of planting, believe it was a good spot for a vineyard. But a German grape grower, a gentleman of experience and culture, being at my place, recommended to me the planting of some Concord four feet apart. The Concord being a rampant grower, I had planted, before that, eight feet apart; he thought they would succeed better four feet apart. I took the German method, and planted that spot with vines four feet apart, because I supposed that, being a barren hill, they would not grow so rampant—that we could hold them in place easily. Let me say, that at one of our exhibitions, where I carried some large, handsome bunches to the guests, a grape grower of Middlesex, and a gentleman of large experience, came to me and asked, 'What is the grape in the other room?' I said, 'the Concord.' 'I don't mean the Concord,' said he, 'but the smaller grape.' 'The Concord.' 'You need not tell me that is the Concord; it is a great deal better; it is one of your improved seedlings,' he said at once. When I told him the circumstances, he said, 'Then I don't know anything about grape growing.' I instance that to show that manure is not necessary; that the grape is so delicate a grower that it does better where the soil is not

manured; if oxide of iron is present, I should think it an advantage. That vineyard gave me bunches half the size of the largest bunches from other vineyards, but the quality was a great deal better, and the fruit makes a great deal better quality of wine, corroborating the opinion of French wine growers, that you must not manure a vineyard."

When the soil is trenched two feet deep, and manured in the lower "spitting," as it is called, the roots of the vine go down after the manure and the moisture, which they find there, instead of filling the proper soil of the surface with roots, as would happen in ordinary culture with the plow and cultivator. In this substratum they rarely find more than fifty degrees of heat. They want eighty and one hundred and twenty degrees. As a consequence the wood is not well-ripened, and the fruit, though it may be large and showy, is not of so good a quality as that from the vines which get the greatest heat at the root; but this is not all the mischief, the immature wood has imperfectly ripened buds; these weak buds give fruit which ripens later than the proper season, and the case continuing, the evil becomes chronic. You may be sure, you will get the best fruit in the warmest soil and aspect, and I believe it would be better to plant in the immediate surface soil than in ground trenched to the depth of two feet. But if your soil overlays clay and is cold and moist, the draining and trenching is the only method by which you can succeed in growing grapes. In this way you can get rid of the water, and by giving access to the air, warm the subsoil to a certain extent. Do not, however, put manure into the subsoil, to invite the grape roots down into the cold; put it rather on the surface and work it in with a cultivator or harrow, and plant your vines as near the surface as is possible without impeding the proper cultivation of the soil.

There is no better liquid fertilizer for the grape vine than sink water, or soap-suds, but this material is not safe to use upon all soils, unless the land is first prepared for it. A grape vine will not thrive in a mud hole, let it be ever so well supplied with the peculiar properties that promote the growth of it. On rolling, sandy soil, the slops are filtered, and the water drained away from around the roots by an under course, and renovating elements left for the fibrous roots to feed upon. The same result is obtained on well underdrained clay soil, but caution should always be used when applying slops and suds around vines so situated that the

surplus water will not pass off. Surface drainings will not do, for then no great amount of nourishment is imparted to the soil where it is wanted.

In California a system is practiced by some scientific grape growers of enriching their vineyards by cutting into fine bits the Spring prunings, and plowing in the same, thus returning the needed material for maturing the vine. This experiment has been carefully and successfully tried, with good results, which are keeping the soil light and porous, and giving to the vineyard a wholesome look and a heavy crop.

"The grape," says Mr. BULL, "requires very little labor, very little care. You plow in Spring and keep down the weeds in Summer; your vine is hardy; you never take it down; there is no tying up, it fastens itself there; you let it run into space. You do not put on much manure. You want a little dressing—lime, phosphate in some form, wood ashes, and, if your vine grows weak, some nitrogenous manure—perhaps guano and ashes would be the best." Summer culture, during the growth of the berry, except to keep the weeds down, is of doubtful utility, often resulting in tearing up the roots near the surface, injuring and weakening the vines, and unfitting them to mature their fruit.

On Thinning Out Grapes.—Another point in grape culture, says the *Horticulturist*, is a judicious and careful thinning of the fruit. Too much fruit not only exhausts the vine and enfeebles it so as to induce disease, but the quality of the fruit is so much impaired that he who buys for the market or wine will reduce the price accordingly. Two pounds of really large and perfect bunches will bring nearly if not quite as much as the three pounds of imperfect ones, and the grower will find for the first a ready sale, while for the second the buyer will hesitate and haggle about the price.

This thinning should be done with a pair of sharp-pointed scissors, cutting out from one-fourth to one-half the berries, taking them from different parts of the bunch, so that when it is fully grown it will be uniform, and the berries will not be any more crowded upon one part than another. It would scarcely be practicable to thin out the berries of all the bunches in a vineyard, and no one would think of cultivating extensively a variety that required it; still, there are varieties which are highly recommended by some persons, that will seldom mature more than one-half the fruit that sets. The bunches of these should be thinned. Some-

times it may be beneficial to remove whole bunches, but when the vines are properly pruned and trained, this will seldom be necessary.

There is an evident mistake in stripping off the leaves to expose the clusters to the sun. It is not necessary that the clusters receive the direct rays of the sun all day long—they often do better without them, while it is essential that the leaves, or lungs, near the bunches be preserved. The shoot may be pinched off a foot or eighteen inches beyond the cluster, but all leaves between that point and the bunches should be left. When the vine is young and growing, a single cluster to the spur is sufficient—or three clusters to two spurs may answer. The superior size of the remaining berries and clusters will more than compensate for those removed, to say nothing of the overtax of the vine in attempting to perfect so much fruit.

Grass and Crops among Grapes.—It is an error to allow a sod to grow close about the stem along this border. The nourishment and moisture which should go to the roots of the vine are appropriated to the grass, and the vine is languishing in consequence. For the same reason growing crops, especially those which make heavy drafts upon the soil, should not be planted close to the grapes. And in feeding the roots, remember that they are no longer close to the main stem, but have pushed in each direction quite a distance. Let the fertilizer be applied there; keep the surface loose and free of weeds.

Effect of Ringing Grape Vines.—Repeated experiments show that the practice of ringing grapes—that is, cutting out circular sections of bark an inch wide—increases the size of the berries over those on canes not girdled, and causes the fruit to mature ten days, or more, earlier than it would otherwise do; but all this at the expense of the flavor, the fruit on the girdled vines proving invariably sourer and less ripe than the others, though as highly colored. It might, perhaps, be said that the cutting off of the downward flow of the sap, somehow prevented the perfect elaboration of the saccharine element. The branch beyond where the ringing is performed is killed by the operation.

Preservation of Grapes.—The farmers in central Pennsylvania have long practiced a method for preserving grapes, which has proved eminently successful. The process may be described as follows: Pick the fruit from the vines when fully ripe, rejecting those which show the least

symptoms of overripeness or tendency to decay. Let this be done at a time when both fruit and vines are dry. A bright, sunny day is best. Take a keg—it need not be perfectly tight—a nail keg will answer; place on the bottom a layer of fresh, green leaves from the vine; on these put a layer of clusters; then another layer of leaves, and another of clusters; and so on to the top, ending with a layer of leaves; so that the fruit may not come in contact with the staves or either head. Be cautious to handle carefully, to press but very slightly, and to move the keg gently after being filled and headed. Next, dig a trench in the soil deep enough to sink the keg so that its upper head shall be a foot, or a trifle more, under ground; keeping the same end up as when being filled. Fill the hole or trench to the upper head, lay over a board, and then fill to four or five inches above the surface of the ground—packing the earth around the keg slightly, and that above the board closely. The finish should be such as to give water of rains and melting snows a tendency away from the trench; and if you wish to have access to the grapes during the cold of midwinter, a mulch of leaves, covered with straw enough to prevent their being blown away, should be applied to prevent the soil from freezing. The kegs need not be watertight; and yet it would be safer if they were, as water, passing in, would undoubtedly spoil the grapes. But the operator, if he has a particle of common sense, can more cheaply prevent this by giving the surface a slope off from the place, than by being at the expense of perfectly tight kegs. It is certain that no more wetting should reach the grapes than would naturally proceed from a soil moderately moist.

The method of C. CARPENTER, of Kelley's Island, an extensive grape grower, is as follows: The grapes must be fully ripe, well supplied with saccharine matter, very carefully handled, and have a cool, dry room, or cellar, to keep them in. They should also either be sealed up so as entirely to exclude the air, or have just air or ventilation enough to prevent molding. A little shriveling does not injure them so much as mold. In a dry day, take a broad basket into the vineyard, gather some of the dry fallen grape leaves, rubbing them in the hands to break them up somewhat, and put a layer of them on the bottom of the basket. Gather the best grapes, carefully cutting out of each bunch the unripe, decayed, and broken berries, with a pair of sharp scissors; do not pick them off with your fingers, for by so doing

you will start some good berries from the stem, causing them to rot and injure others. When trimmed lay each cluster in the basket until one layer is complete, and then place layers of leaves and grapes alternately, finishing with a layer of leaves—not packing more than ten or twelve inches of fruit, lest the weight should break those at the bottom. The fewer handlings they receive the better. With all these conditions observed, they will keep good four or five months; and the few varieties with the thickest skins and the most sugar keep best through the Winter—the Agawam or Rogers' No. 15, Catawba, and Diana, when well matured, are among the best for the purpose.

In England and France dried fern leaves are used very extensively for packing fresh fruit, grapes especially; they seeming to possess, in an unusual degree, the property of preserving vegetable and even animal substances for a long time. Dipping grapes in lime is objectionable, even if it should preserve them, which is doubtful. They may, however, be kept for months, if hung, stalk end downward, in a cold, dry, dark closet.

Covering Grape Vines in Winter.—Dr. JOSEPH HOBBS, President of the Wisconsin Horticultural Society, gives this suggestion, founded on his experience: "Begin by laying down in the direction you mean to continue, and you will find, after the first year, you will have little or no trouble in bringing your vine, however thick it may be in the stock, almost close to the ground. *Lay down in the same direction every year.* This, to be done easily and without injury to the vine, or inconvenience to yourself from bad weather, should be done at the time of pruning. At such a time the vine bends more freely. With the stocky and older vines I sometimes use forked sticks, which are driven into the earth, forcing down the vine as near the surface as possible, which practice saves both labor and material in covering. Winter protection is afforded, where there is plenty of space, by earth, and, where things grow pretty close to each other, by loose stable litter. I use the latter, putting it on from three to five inches, according to the exposure, or the more or less hardy character of the vine."

"Where the plants can be bent readily to the earth without breaking," said the late E. B. QUINER, "I have always found that the best covering was simple earth. Straw is objectionable on account of harboring mice, and manure is too heating. Some use old leaves or strawy litter. The object to be gained is to prevent

the alternate freezing and thawing during the Winter, and this is better accomplished by two inches of earth, or tan, where it can be procured. Grapes said to be hardy will yield altogether a better crop for being covered. Fruit buds fully exposed to our severe Winters are weakened, if not entirely destroyed; and, although a partial crop may be had, yet it will not be equal to that from plants which have received protection."

Dr. JABEZ FISHER, of Massachusetts, says: "I have not usually given the Concord grape any Winter protection. It is generally so well ripened and so hardy in its nature as to endure ordinary Winter weather without protection; but in unfavorable seasons it is liable to be insufficiently ripened to withstand the influence of extreme cold without suffering, and in such cases there follows a partial or even a total failure of a crop. In fact the Winter of 1860, 1861, showing a temperature of twenty-two degrees below zero on the 8th day of February, killed all the wood which stood above the snow line on that day. This might not have happened, and probably would not, if the wood had been well ripened in the Autumn previous. The Autumn of 1860 was very wet, and slightly cooler than the average of seasons, and the foliage of grape vines and even apple trees was killed by a severe freeze on the 1st day of October, while still green and growing. Vines planted in the way I have described, can be easily laid down at a cost of not more than one day's labor of a man and a boy for an acre, which is a very cheap insurance, considering the risk of so valuable a crop. My vines are planted on the east side of the trellis, a foot from it, and are trained in a slanting direction to the lower wire. Above that point they are carried up on the west side of the trellis, so that when pruned, and the ties cut, they fall toward the ground on the west side by their own weight. A boy can hold them down, while a man throws three or four shovelfuls of soil upon them to hold them in place."

In covering, the soil should be a dry or sandy one, as a heavy clay tends to too much wetness and injury to the dormant buds. Let the vines remain covered in a northern climate till the 15th of May.

Even when grape vines are thrown down upon the ground, without any sort of protection, they are less liable to injury than those fastened to the stake or trellis, exposed to the bleak winds. It is better to cover them.

Hon. M. P. WILDER, and his fellow-men-

bers of the Massachusetts Committee to the Paris Exposition in 1867, in their report on the culture and products of the vine, observe: "For Winter protection it is the common practice in Europe to go through the vines with a plow every Fall, and throw up a good ridge of earth against the stalks. The Hungarians have a more effectual way of guaranteeing against the cold of their rigorous Winters, which is to lay the vines on the ground, cover them with straw, and on the straw throw the earth; without this it is said they could produce no wine at all. Our native grapes are generally hardy, and will live wherever their fruit will ripen, but occasionally there is a severe season which seems to touch the very heart of the wood, and so enfeebles it that it falls an easy prey to disease. It was noticed that the mildew set in with great destructiveness after the two hard Winters of 1854 and 1856."

Varieties.—Brief notices of the principal grapes cultivated in this country will here be given, as tested by the best American grape growers:

Adirondac.—An excellent early grape, preceding the Hartford Prolific in ripening, possessing a thin skin, and an agreeable delicacy of flavor. In some localities it succeeds well, and in such it proves exceedingly desirable for early marketing. Its liability is to mildew and tenderness.

Allen's Hybrid.—A fine white grape, bunches large, shouldered and compact, and quality first best. Vine a little tender. "I like this vine and its fruit," says Dr. HOBBS, "better and better the older it grows; it has borne well and fruited well with me in Wisconsin." In Ohio, it is liable to mildew.

Alvey, or Hagar.—This belongs to a class of Southern grapes, that have not, on the whole, been very successful at the North, yet it appears to be quite hardy in protected situations, and fully ripens. The fruit is too small for table use; Dr. WARDER commends it for the Ohio Valley as "fine and vinous."

Black Hawk.—This is a seedling of the Concord, commended by Dr. WARDER as among the hardy, healthy, and productive varieties, early and sweet. Both the Black Hawk and Martha, says the Ohio Pomological Report for 1866, have the sterling good qualities of their parent—vigor, hardiness, and perfect health.

Cassady.—A Philadelphia seedling; berry, medium, greenish-white, covered with a whitish

bloom; fruit, juicy, pleasant, vinous, but not rich. Ripens the last of September.

Catawba.—One of the oldest grapes in cultivation in this country, with its large, round, thick-skinned, deep-red berries, covered with a lilac bloom. It will not bear manuring. Up to 1860, there were about a thousand acres of the Catawba vineyards in the vicinity of Cincinnati, yielding, in favorable seasons, two hundred gallons of wine per acre. But owing to its uncertainty, on account of the rot, it is now in many sections, especially at the North, being discarded, and more reliable kinds substituted. In localities where it will mature, and is not effected by the rot, there are few better varieties. At Burlington, Iowa, are several large vineyards, cultivated by Swiss and German vine growers, where an excellent Catawba wine is made, closely resembling the "Rudesheimer Berg" of the Rhine.

Clinton.—This is one of the hardiest of grapes; and in many localities it does well, producing a brisk, spicy, vinous fruit; is a perpetual bearer, and generally healthy, though in some regions in the Northwest it suffers from thrip and mildew. It appears to succeed best when permitted to ramble over a tree. The fruit makes good sauce and jelly, and, if kept until after midwinter, its sharpness becomes so softened as to render it pleasant. It should be planted on rather a poor soil, as it is naturally a rampant grower—otherwise it will become almost uncontrollable.

Concord.—This is denominated the farmers' grape—the grape for the million—the grape for the whole country. It possesses the several characteristics of great hardiness, productiveness, freedom from disease and showy appearance, while its bunches are large, berries large and purple, and of a sweet aromatic flavor. Time of ripening, about ten days earlier than the Isabella. It does best on a sandy land, and poorest on heavy clayey soils; high feeding would prove its worst treatment. The American Pomological Society have placed it highest on the list of grapes most widely diffused and approved in the country. It was awarded the LONGWORTH prize as the best wine grape for Ohio, and the best table grape for the whole country; and the GREELEY prize as the best grape for general cultivation.

GEORGE HUSMANN, of Herman, Missouri, a practiced vine dresser, of many years' experience, who has written an able work on the Culture of the Grape, claims, in the *Horticulturalist*, the Concord as *the best grape for everybody*.

"This," he continues, "is a bold position to take for any fruit, but I take it after trying this grape for seven successive years, and after comparing it with about sixty varieties I have in bearing, and also after due consideration of *pros* and *cons*. Now let us see why:

"1. The vine is a strong, healthy grower, and will succeed in any soil so as to give a fair crop under any treatment.

"2. It is entirely free from disease, and entirely hardy.

"3. It is, under proper treatment, a great bearer, and always ripens its fruit well.

"4. It has a fine, large, handsome bunch and berry, which sells readily in market.

"5. It is a good wine grape, as it makes a wine equal to the best Catawba, if not superior, and we pretend to know here what good Catawba is, having grown it for sixteen years. It also makes more of it than any other grape I know of, to the acre, as it is nearly all juice."

Mr. BULL, of Concord, Massachusetts, the originator of this grape, states: "For sixteen successive years it has not failed to give me a remunerating crop;" that one acre of well-established, healthy vines will give about seven tons of grapes, worth at wholesale, on an average of the last four years, fourteen cents per pound, or about \$2,000; and this amount, large as it is, has been exceeded in many cases; but, if you reduce the result one half, you still have one of the most profitable crops known to our husbandry; that no other farm crop requires so little manure as the grape—that he has vines which give him annual crops of one hundred and twenty-five pounds each, which have had no manure for ten years, having given them forty loads of light compost per acre to promote the formation of roots the first year.

Creveling or *Catawissa*.—A black grape of good quality, and so hardy that it succeeds quite well in the Northwest. Ripens early in September, with bunches of medium size, fruit moderately juicy, sweet, not high flavored, but good. At the meeting of the Wisconsin Horticultural Society, in February, 1869, it was said that the *Creveling* produced more in quantity than any other variety, and was better in that latitude than the *Hartford*; and President HOBBS added, that he ranked the *Creveling* among the very best grapes; "it is hardy, not being injured by the drought of Summer or the cold of Winter; and that man who wants a grape for the palate should get a *Creveling*." It has been objected to on account of its tendency to straggle and make loose bunches; this E.

A. THOMPSON, of Hillside Vineyard, near Cincinnati, insists, is altogether owing to its being deficient in inflorescence, which he remedies by planting it in alternate rows with the *Concord* and *Hartford Prolific*, from which varieties it is fertilized by impregnation. It seems destined to take the place of the *Catawba* as a table grape; it is an excellent bearer, vinous, and makes a good wine.

Cunningham.—A fine wine grape raised in Missouri and farther South; will not succeed north of Missouri, as it barely ripens there.

Cynthiana.—The fruit of this variety is described by FULLER as "small, black, or blue-black, sour, and worthless." Yet GEORGE HUSMANN says it is a dangerous rival to the *Norton* for a wine grape, making altogether the best red wine we yet have, resembling, but far surpassing, the best *Burgundy*.

Delaware.—Very hardy, productive, and generally free from disease; bunches small and compact; berries small, translucent, with a pink tinge, and very sweet and delicious. It should be planted on a rich, dry soil to do well, and requires high feeding. It is a rich grower, and ripens in different localities from the first to the end of September. Succeeds moderately well in the Northwest, and is popular in all sections of the country.

Diana.—A red grape, a seedling from the *Catawba*; bunches large and compact; the thick skin of the fruit makes it eminently a grape to keep well till Spring, with very little trouble, and its peculiar musky flavor disappears after it is kept awhile. It is very productive, and ripens with the *Concord*, about the 20th of September; and keeps improving for nearly a month, if permitted to hang so late. When fully ripe, it is luscious. It should be planted on a light, dry, warm soil or sandy loam; does poorly on heavy soils, and will not bear manuring. Experience has proven that it is not well suited to the Northwest, as it is apt to winter-kill, and does not ripen evenly; yet in some localities, in Wisconsin, it has succeeded very well. The *Diana* improves in bearing with increased age.

Elsinburgh.—A small black grape, with large and somewhat loose bunches, berries small, thin skin, a sweet, vinous flavor—excellent for the table. Too small for vineyard planting; as hardy as the *Isabella*, and ripens a few days before it.

Golden Champion.—This is a grape cultivated in Great Britain, and as yet not much known in this country; it appears destined to

hold about the same rank in that country that the Concord does in this. It is a white grape, and is remarkable for its wonderful size and exquisite flavor. The *Horticulturist* gives a figure of it, by which a single berry measures full an inch and three-eighths in diameter one way, and an inch and five-eighths another, justifying what is said of it—a “magnificent berry.”

Golden Clinton.—This is a seedling from the common Clinton; perfectly hardy; free grower; and a great bearer. Ripe 15th of September; skin thin; flesh very sweet and juicy, with no pulp. A nice white grape, and considerably cultivated in the State of New York.

Hartford Prolific.—A very productive bearer, hardy, and requires severe pruning, and checking of the young bearing canes in Summer, or the bunches will be loose and the fruit shake off quite early. Has not generally succeeded well in the Northwest, the quality of the fruit being regarded as insipid; while in a milder region it proves a valuable table grape on account of its early ripening qualities, being fit for market, as raised on the hill-sides near Cincinnati, as early as the fifth of August, and elsewhere about the 1st of September, the fruit being sweet, juicy, somewhat foxy in flavor—in quality only passably good.

Herbemont.—Very prolific, bunches large, berries small; color dark purple; a late bearer; but while best adapted to the South, it ripens in the Ohio Valley, where it was many years since introduced from South Carolina. It is generally unsuited for the Northern States. It is a fair table grape, but chiefly valuable for its wine properties. The bunches require to be properly thinned.

Iona.—A seedling of the Catawba; bunches large and compact; berries large, round, semi-transparent when they begin to ripen, but growing opaque as the color deepens, becoming dark-red when fully ripe, about the middle of September; sweet brisk flavor, excellent, but not quite equal to the Delaware. It is hardy, and will succeed where the Concord and Delaware will. It requires a dry situation, and in any soil approaching wet, muck, or rich peat, its roots are invariably unhealthy. In some seasons it has defoliated badly in portions of the East and West.

Isabella.—This is an old, well-known variety, now largely superseded by earlier and better sorts. It bears well, and the fruit is good. It is still cultivated in portions of the Northwest. It is liable to mildew, except when permitted to run into trees.

Israella.—This is pronounced the best flavored of the early grapes. It is a valuable acquisition to our varieties, combining earliness with good quality and great productiveness. It can be kept till Spring with little trouble. Ripens about September first, or same time as Hartford Prolific. Bunches large, compact, shouldered. Quality good. Hardy, and its thick skin give it a superiority for distant shipping, which will no doubt cause it to rank as our best early market grape when it becomes better known. Very desirable where it succeeds well; but in portions of the West its foliage has not been found able to withstand the attacks of the mildew.

Ives' Seedling.—Bunches large, and very prolific; vine hardy and free from disease; succeeds well in the Ohio Valley; Dr. WARDER attributes to it vigor, health, and productiveness. It ripens early in September, and is consequently never injured by early frosts. E. A. THOMPSON, of Hillside Vineyard, near Cincinnati, who has over sixteen acres of this variety, considers it the most profitable grape in cultivation. It received the LONGWORTH prize as the best wine grape for the whole country.

Janesville.—This is a new hardy variety, produced at Janesville, Wisconsin, adapted to many localities, in the Northwest—ripening its wood and fruit well in Wisconsin, standing the Winter where the Concord and Delaware have failed; and though in quality its fruit can not be placed at the head, yet its great hardiness, and ripening in August, will be likely to render it a valuable acquisition for the northern borders of our country.

Josephine.—A seedling, raised by Dr. HOBBS, President of the Wisconsin Horticultural Society. It is a hardy, strong, vigorous grower, and bearer of good fruit; berry and bunch fair size, rather Isabella-like in shape and color. It is healthy, and promises well for the Northwest.

King.—JOSIAH SLATER, of Rochester, New York, represents this variety as very hardy; a free grower, and an abundant bearer; bunch and berry small to medium; berry round and black, good, with rather thick skin, which makes it a good keeper. Ripens last week in August—Mr. SLATER preserved a bunch, picked 2d of September till 16th of March, when they had become “pretty fair raisins.”

Lenoir, or Louisville Seedling.—A black grape, healthy and vigorous, much cultivated in the South, suitable for wine; fruit medium to large,

juicy, with little pulp; second quality; ripens middle of September.

Logan.—Vine of moderate growth, healthy, and very hardy; only moderately productive; bunches medium, generally loose; berries full medium, oval, black, with little bloom, early; sprightly, vinous, good flavor.

Longworth.—Described and recommended by Dr. WARDER as a new, very fine, small juicy grape.

Lydia.—A new variety raised by Mr. CARPENTER, of Kelley's Island, Lake Erie; a large white grape that promises well; of excellent quality, although not a heavy bearer. Tolerably hardy; a supposed seedling of the Isabella, and ripens early, about with the Concord.

Lyman.—Described and recommended by Dr. WARDER as a healthy, hardy, productive, and late grape. The vine is remarkably thrifty; fruit medium size, dark blue or black, and full of sweet juice.

Main.—The *Magazine of Horticulture* describes the Main grape as three weeks earlier than the Concord, but of a different variety; while others express the belief that it is identical with the Concord. The original vine at Concord, New Hampshire, produces five or six hundred pounds, annually, of fruit of a superior quality.

Martha.—A seedling of the Concord, ripening from six to ten days before the Concord; its hardiness for the Northwest not yet sufficiently tested. Bunches medium; berries large, round, pale yellow; sweet, juicy, slightly foxy; quality very good, most of the berries containing only a single small seed. Hardy, healthy, a strong grower, and promises to be quite productive. "Taking hardiness," says Dr. WARDER, "healthiness and all other good qualities into consideration, I regard it as of more value than all the rest of the white grapes put together." It is, says GEORGE W. CAMPBELL, the most valuable white grape yet introduced, and is emphatically a grape for the people; and the vine is just as healthy and hardy as the Concord, and will grow any and everywhere that any grape will succeed. It gives much promise as a white wine grape, yielding a must or juice of great richness.

Miles.—CHARLES DOWNING has brought this variety into notice as one of really early maturity of fruit—ripe and sweet a week before the Hartford Prolific. The fruit is not of large size or bunch, but the vine is hardy and productive; berries black, sweet, rather buttery, and good. F. R. ELLIOTT says it ripens earliest

of all, and commends the Miles and the Mottled to the grape growers of the North and West as hardy and desirable.

Mottled.—As a table grape it is not equal to the Delaware, but it is very hardy, the fruit excellent, and regarded as good for wine.

Northern Muscadine.—Dr. HOBBS says: "My vine, eight years old, has never done so well as this year (1867). Its crop, excellent has never been surpassed by any other variety. I think more and more of it every year. I eat more and more of its fruit every year, and I can not help thinking that this vine is greatly underrated. I know its history; it is a lowly one. I know the opinion concerning it entertained by men called the best judges. I know also about its proneness to drop—"the ripest fruit first falls"—and its peculiar flavor, but all this does not prevent me from speaking of it as I find it, and I could strongly and confidently recommend the general planting of it in Wisconsin. The Concord was the abused grape, the Northern Muscadine is now the abused; I am not afraid nor ashamed to predict its increasing reputation in Wisconsin." The *Gardener's Monthly* also commends it very highly.

Norton's Virginia.—This is one of the Clinton sort, hardy, and free from disease, with small, very compact bunches; fruit of good size; suitable to the Southern region; esteemed in Missouri as one of the best and most reliable wine grapes.

Rebecca.—A sweet, good, white grape; probably a seedling of the Isabella, but ripens about a week earlier; rather a shy bearer until it gets well established; vine is rather tender, and liable to sun-scald, yet has succeeded quite well as far north as central Wisconsin, protected by strong growing vines on either side.

Rogers' Hybrids.—E. S. ROGERS, of Salem, Massachusetts, has, at the request of the Lake Shore Grape Growers' Association, and other horticulturists, given distinctive names to the most approved varieties of his hybrid grapes. He thus describes, in *Tilton's Journal of Horticulture* for May, 1869, the twelve varieties which have been selected as most worthy of names:

"*Gæthe*, No. 1.—Though this variety is perhaps more unique, and shows more of the character of the European species than any of the other sorts, the vine is one of the hardiest, and very free from mildew. It produces large crops of beautiful clusters and berries, free from rot or imperfection of any kind. The bunch is large, shouldered; berry large; in shape

long, oval, resembling the Malaga; of a yellowish-green toward the sun; skin thin; flesh tender and melting throughout, very sweet and delicious, with a pleasant and peculiar aroma. This variety is so late as seldom to ripen here, but, as far south as Washington and St. Louis, is considered one of the most valuable.

"*Massasoit*, No. 3.—Bunch of medium size, rather short, with shoulder; berry of medium size; color red; flesh tender and sweet, with a slight trace of the native flavor when fully ripe, though not so much as to be at all objectionable, but, on the contrary, rather pleasant. As it is very early, this is one of the most valuable for cultivation at the North.

"*Wilder*, No. 4.—Bunch large and showy, so much resembling Black Hamburg as to be hardly distinguishable in appearance; berry globular, large; color black; flesh tender, with a slight pulp. The fruit ripens as early as, and frequently earlier, than the Concord, and can be kept a long time. It has become the most popular of all, and is one of the most profitable for market purposes, its size and beauty being equalled by its vigor, hardiness, and productiveness.

"*Lindley*, No. 9.—This, together with all those numbered from 5 to 14 inclusive, was hybridized from the Chasselas; while the remaining numbers were fertilized with Black Hamburg. Vine of very vigorous growth, making rather long-jointed wood, but sometimes very fruitful. The foliage when young is of a reddish color. The bunch is long, compact; berries globular, reddish; flavor sweet. It resembles the Grizzly Frontignac in appearance of bunch and flavor, and has scarcely a trace of pulp. It ripens among the earliest.

"*Gärtner*, No. 14.—Bunch above medium size; berry from medium to large; skin thin; color light red, with a pleasant aromatic flavor. The vine is productive, and the fruit ripens early.

"*Agawam*, No. 15.—This variety has been here considered the highest flavored of the series. Bunch large, somewhat loose, shouldered; berry large, globular; skin thick, of a brownish-red color, like the Catawba; flesh tender and juicy, free from tough pulp; flavor very rich and pleasant, having a peculiar aroma, thought by some to resemble the Black Hamburg. The vine is the most vigorous of all, and very productive; but in unfavorable seasons and soils the fruit is somewhat inclined to rot.

"*Merrimack*, No. 19.—The bunch is gener-

ally not as large as the majority of the black varieties; berry large, globular; skin black; flavor sweet and rich. Ripens early, and is of uniformly good quality, even in unfavorable seasons, vine very vigorous, and a good bearer. This may be classed among our best early grapes.

"*Requa*, No. 28.—Bunch large, shouldered; berry of medium size, roundish; skin thinner than most of the collection; color red; flesh tender and sweet, having in some seasons a trace of the native flavor.

"*Essex*, No. 41.—Bunch of medium size, shouldered; berry somewhat flattened, in this respect resembling the native parent; flesh tender and sweet, with a high aromatic flavor, excelling on this point most of the black varieties. Ripens early.

"*Barry*, No. 43.—Bunch rather short, broad and compact; berries roundish to oval, much like Black Hamburg, in general appearance; flesh delicate, sweet, and tender; skin thin; color black. Ripens as early as the Concord, and is one of the best black grapes. Vine very vigorous and productive.

"*Herbert*, No. 44.—Bunch rather long and loose; berry of medium size, round, or sometimes oblate; flesh tender, sweet and rich. Early and productive.

The Salem, or No. 53.—We append Mr. ROGERS' description of his Salem grape, named, as he says, from the place of its origin: "This is a variety considered not only superior to any of the former well known numbers, but also to any hardy grape at present before the public, combining as nearly as possible every quality desired in an out-door grape, being one of the hardiest, healthiest, and most vigorous of vines, and producing enormous crops of beautiful and high-flavored fruit.

"Like other well-known kinds, Nos. 4 and 15, this is a hybrid between a native and the Black Hamburg, bunch large and compact; berry large as Hamburg, of a light chestnut or Catawba color, thin skinned, perfectly free from hard pulp, very sweet and sprightly, with a most exquisite aromatic flavor; not equalled by any other out-door grape for wine or table; as early and hardy as Delaware or Hartford, having never failed to ripen its fruit in the most unfavorable season, for the past six years. Taking all its qualities into consideration, earliness, hardiness, and great vigor of vine, size and quality of fruit, it is pronounced by the best judges who have tried it, to have no equal among all the numerous varieties now before

the public; and I can with confidence recommend it as the best of all my collection."

Mr. ROGERS has never been considered by those who know him, as extravagant in his statements, and this, after thorough testing, was his careful description of the Salem grape.

It was said of these grapes, at the meeting of the Wisconsin Horticultural Society, in February, 1869, that several of them are almost as sweet as the Delaware, and sweeter than the Concord, and begin to color about August 15th; and that they keep better than any other grapes in that latitude—and that the Agawam, No. 15, could be kept, it was believed, till April, as good as when gathered. It ripens ten days before the Concord.

Scuppernong.—It was first brought into notice at Scuppernong, North Carolina, and is peculiarly adapted to Southern culture. Dr. WARDER has seen it grow vigorously as far north as Washington City, but rarely producing fruit. It is long-lived, never fails to bear, never mildews, never rots, and matures early in southern latitudes. It needs no pruning, nor training. The fruit is sweet and refreshing, and is regarded throughout the South as the *Poor Man's Friend*. There are three varieties—white, black, and golden-hued. The vines at maturity yield from twelve to fifty bushels of grapes each, and from thirty-five to one hundred and fifty gallons of wine—a bushel of grapes ordinarily making three gallons of wine. It has been estimated by Mr. VAN BUREN, a Southern vine grower of experience, that one hundred vines, planted on three acres, will yield every year five thousand two hundred and fifty gallons of wine, or one thousand seven hundred and fifty gallons per acre; while M. F. STEPHENSON says this estimate is entirely too low, that one hundred vines will yield twice as many gallons at ten years of age, and three or four times as much as they grow older. The celebrated chemist, Dr. JACKSON, of Boston, analyzed thirty-eight of the best wine grapes of America, and says: "Scuppernong wine may be made so fine as to excel all others made on this continent."

The White Scuppernong variety, says I. M. D. MILLER, makes a beautiful pale amber-colored wine; sweet, rich, luscious, fragrant, very pleasant, and everywhere the ladies' favorite—so says the President of the Memphis and Little Rock Railroad, who has been familiar with it for many years. Mr. BUNTNER, of North Carolina, a celebrated vinist, says its effervescing quality will render it the champagne grape of

this continent. The Black Scuppernong makes a darker colored wine, somewhat stronger and heavier than the white variety. A mixture of the two makes a wine superior to either. Colonel ROSE took the premium in Georgia for this mixed wine. The third variety, ripening much later, makes an exceedingly strong drink, which readily induces intoxication.

Taylor's Bullitt.—Originated in Kentucky; a rampant grower; productive in that latitude; fruit, medium size, pale, greenish-white, vinous, and of good quality.

To-Kalon.—The To-Kalon is one of the finest grapes. When well ripened it is perfectly sweet and luscious, with a very agreeable aroma. Flesh very delicate and tender, the seeds leaving it as freely as from any foreign variety. Berries an inch in diameter; bunch large; color, dark amber, inclining to black; quite hardy; strong grower; with peculiar beautiful foliage, and moderate bearer. The fruit is subject to rot, yet succeeds in some localities.

Union Village.—A splendid grape, as large as the Black Hamburg, showy and beautiful, resembling the Isabella, probably a seedling of that variety, and scarcely better in quality, though of nearly double the size. Bunches very large and compact; berries large, thin skin, covered with bloom, quite sweet, but not rich, very little pulp. Ripens early in October. Vine a vigorous and coarse grower.

Best Varieties for Different States.—The American Pomological Society, in 1868, proclaimed that, of the hardy varieties of grapes the Concord, the Delaware, Hartford Prolific, and Diana, are widely diffused and approved.

New England.—Concord, Hartford Prolific, Delaware, Diana, Rogers' Hybrids, Allen's Hybrid, Rebecca, and others. In 1867, the Martha, the Black Hawk, and the Clinton suffered least from mildew in Massachusetts, of all the grape varieties.

New York.—A vote taken at a Fruit Growers' Society, recently, at Rochester, for the twelve best varieties—twelve varieties being voted for on one ballot, and thirty-eight votes being cast, resulted as follows, viz.: Diana, 38; Delaware, 37; Concord, 33; Iona, 31; Creveling, 30; Adirondac, 26; Israella, 26; Rogers' No. 4, 22; Isabella, 23; Rebecca, 26; Hartford Prolific, 27; Catawba, 13; Rogers' No. 19, 15; Union Village, 7; Clinton, 7; Allen's Hybrid, 6; Ives' Seedling, 2; To-Kalon, Rogers' No. 44, Rogers' No. 39, Perkins, Maxatawny, Nor-

ton's Seedling, Coriella, and Cuyahoga, one each.

F. C. BREHM, the well-known vineyardist of Waterloo, New York, furnishes the *Rural New Yorker* with the following dates of the full ripening of different varieties in 1868: Hartford Prolific and Israella, September 10th; Creveling and Rogers' Hybrid, No. 4, September 16th to 20th; Delaware, Alien's Hybrid, and Rebecca, September 20th to October 1st; Iona, about the same time; Concord, barely got ripe; Union Village, Diana, Catawba, Anna, and other late varieties failed to get ripe in consequence of the heavy frost of October 1st. He adds that the Israella, Rogers' Hybrid No. 4, and Creveling are varieties more particularly worthy of public favor, being early, productive, and good shipping grapes, standing carriage well, and not dropping off, like the Hartford Prolific, or bursting open like the Concord. They are good in quality and good keepers. They are hardy, except the Israella, which should be covered during Winter. Rogers No. 4 proves to be as hardy as the Concord, and as productive, while it is earlier and of much better quality. The lateness of the past season prevented the Diana from ripening fully—were it ten days earlier, it would be preferred to any other.

New Jersey and Pennsylvania.—Concord, Delaware, Diana, Hartford Prolific, Ives' Hybrids, Martha, Creveling, Elsingburgh, Maxatawny, and others.

Ohio.—Concord, Delaware, Creveling, Catawba, Iona, Black Hawk, Hartford Prolific, Ives' Seedling, Diana, Rogers' Hybrids, Martha, Isabella, Mottled, and others.

Indiana.—The Hartford Prolific, as everywhere in the West, appears to be conspicuous as an early, hardy, and reliable grape. Ives' Seedling is reported to be rather a slow grower; but a great bearer. Rogers' No. 9, and Iona, are said to be about of equal value. The Concord and Delaware both succeed finely.

Illinois.—Concord, Delaware, Hartford Prolific, Creveling, Diana, Catawba, Isabella, Clinton Improved, Perkins, Blood's Black, Ives' Christine, Dracut, Amber, Martha, and Ives' Seedling. Grapes sold in Chicago, during 1868, at from fifteen to twenty-five cents a pound.

Missouri.—Concord, Hartford Prolific, Norton's Virginia, Ives' Seedling, Delaware, Clinton, Taylor, Northern Muscadine, Arkansas, Heribmont, Catawba, and others.

Kansas.—A correspondent of the *Prairie*

Farmer, residing at Fort Scott, Kansas, says that most kinds of fruit succeed well in that region. The Concord, Iona, Delaware, Isabella, Rebecca, Catawba, Allen's Hybrid, and others, all remained through the Winter of 1867-8, on the trellis where they grew, without any protection. They occupied three-fourths of an acre, and not one vine was injured by frost, nor in any other way—no mildew—and all bore good crops and ripened well. The owner, after keeping what he wanted for his own use, sold over seven hundred dollars' worth. The soil is underlaid with limestone.

Kentucky.—Delaware, Clinton, Hartford Prolific, Logan, Venango, Concord, Diana, Elsingburgh, Catawba, Lyman, Taylor's Bullitt, Golden Clinton, Marion Port, Anna, Alexander, and others.

The Northwest.—Concord, Delaware, Hartford Prolific, Northern Muscadine, Creveling, some of Rogers' Hybrids, Isabella, Josephine, Janesville, and others; require to be laid down in October or November with a covering of two or three inches of dirt, by which fine crops of luscious grapes will be secured. They require a warm exposure, moderately deep preparation of soil, no manure, good underdrainage, and protection from southwest winds.

Mr. GREENMAN, in an able Essay on Grape Culture, read before the Wisconsin Horticultural Society, in February, 1869, observed: "The selection of varieties, especially in the Northwest, is an important matter. This will depend more upon the location than the soil, as the aggregate amount of heat differs materially in the same latitude, and their adaptability, can only be approximated by a close observation of the amount of heat required by the different varieties, to bring them to perfection. From observations taken at Waterloo, New York, in 1862, and reported in the *Horticulturist*, I find that it requires an average of 53° of Fahrenheit to bring the Delaware to leafing, which occurs about the middle of May, and an average temperature of 59° for a period of forty-five days, or a total of 2678° Fahrenheit from the breaking of the leaves to the setting of the fruit; and requires a period of 122 days, with an average of 68°, or an aggregate temperature of 7927° from leafing to the ripening of its fruit; while the Concord requires about 500° more than the Delaware, to bring it to perfection; and the Isabella needs 10,000°, while the Catawba can not do with less than 11,000°, and requires about 142 days from leafing to ripening. At Janesville, Wisconsin, for a period of

six years, the Summer mean temperature averaged 71° Fahrenheit, and at Prairie du Chien, for nineteen years, the Summer mean corresponds to 72° Fahrenheit, while at Green Bay, for four years, the Summer average was 68°. From this I conclude that the Delaware and Concord may be safely planted in southern Wisconsin, and that the Delaware will ripen at Green Bay; while near large bodies of water, or on high altitudes, where the September mean temperature extends into October, without intervening frosts, the Isabella, Catawba, Iona, and some of Rogers' Hybrids, with other late ripening varieties, will succeed. I therefore further conclude, that no varieties should be extensively planted, that requires an aggregate Summer temperature of over 8,000° Fahrenheit, while near lakes, as at Madison, Wisconsin, or on the bluffs along the Mississippi, or near Baraboo, Wisconsin, the late ripening varieties may be planted with expectations of success."

The South and Southwest.—Dr. P. J. BERCKMANS, of Augusta, Georgia, the highest authority in the South on grape culture, speaks highly in favor of the Scuppernong, indigenous to the country, which thrives healthily on hill or bottom, requiring no experienced hand to trim it. Its capacity of production is fabulous, when compared with other vineyard varieties. Instances of a single vine covering one acre of ground are numerous, and sixty barrels of wine its product in a single season. These are exceptions which vine growers must not all expect to realize. But they are merely given as an evidence of wonderful fertility. The next best wine grape for the South is the Clinton, which though of Northern origin, improves as it is carried southward—it is prolific, and makes a heavy-bodied claret. Other wine varieties are coming into notice, among them the "Tres Seedling."

Our good table grapes, says Mr. BERCKMANS, are becoming numerous. "First comes the Delaware, which seems to thrive everywhere South. The Isabella bids fair to excel the Delaware; its quality is superior to any of its class; so far it has not decayed, although, from the short time since its introduction South, we can not decide, but we have decided in opinion as to its ultimate behavior; still, two years' fruiting, during which it bore perfectly sound crops, and this during a period when many other varieties, of like recent introduction, decayed, is a fair beginning, and likely to end well. The Hartford Prolific is as yet our best very early grape. As a profitable market fruit,

it stands first in order. The bunches and berries are large, of fine appearance, fair quality, and stand carrying to market better than any other variety. It is not so liable to drop its berries as in Northern States. Its earliness will always make it command a high price. The Miles is better in quality, fully as early, but not so fine in appearance."

Grape Wine.—JEFFERSON recorded his opinion, that "no nation is drunken where wine is cheap; and none sober where the dearth of wine substitutes ardent spirits as the common beverage." For its excessive use, or for the excessive use of tea and coffee, and their consequent deleterious effects, there can be no justification. Pure wines, and similar diffusive stimulants, are frequently employed for medicinal purposes, and it is wiser to have them produced by well-known wine growers in our own country, than to have the villainous compounded poisons which so often find their way to the bedside of the sick.

Says F. R. ELLIOTT: "In the older portions of the Union, North and South, East and West, the grape is destined to play an important part in contributing to the food of man and promoting his general health, and in forming a moderately stimulating drink as a tonic beverage, for let us say what we will, man ever has and ever will have some stimulus to replace the exhausted energies of the system caused by a severe practice of physical labor. I have no disposition to take up a discussion on the advantage or evils of the practice, I only speak of it as one of early origin and continued use, and with no probability of being abandoned. So viewing it, and looking to its continuance, I prefer wine of the grape to whisky of the corn, and therefore would advise the planting of such varieties, as, while contributing of their fruits for eating, to the pleasure and health of all men, may furnish a surplus to be made into a wine which shall stimulate but not easily intoxicate."

At the meeting of the Massachusetts Agricultural Society, in December, 1867, Professor AGASSIZ said: "I was born, and have lived two-thirds of my life in a grape-growing country, and I feel deeply interested in the question, how the grape shall be grown here successfully. But I think it can not be grown with perfect success until a prejudice which exists throughout the whole country is overcome. It is because I know that it is a prejudice that I would openly speak about it. Wine growing

countries are the regions where temperance prevails; where there is no drunkenness. They are countries where the traveler is helped to a glass of wine to warm and strengthen him; they are countries where the clergyman holds it to be an act of charity to give a glass of wine to him who needs comfort. That is the character of wine-growing countries. Here, the use of wine is considered a sin, and men who use it are considered men not deserving to be in the company of gentlemen. Now, I will say, that before I came to this country, now twenty years ago, I had never taken a glass of water over a meal in my life; and I will say another thing, that as long as I have lived, and I am sixty, I have never been flushed by the use of wine; I will not speak of drunkenness. I know that my mother gave her children—myself among the rest—wine as soon as they were weaned, and I know that I have done the same with my own children. But, gentlemen, until you have overcome the prejudice which exists throughout the country against the use of the pure juice of the grape, as a daily beverage, you will never bring the cultivation of the grape to its right foundation, and you will not receive from that crop the return you are entitled to obtain. In countries where the grape is cultivated as the principal crop, the product from the sale of the grape is not the chief reward for the culture, it is the wine; and you will not be thoroughly successful, you will not have that variety of grape, you will not have those diversified modes of cultivation, which will secure its production on a large scale, until you have introduced the use of wine as a daily beverage in every household, and as the most wholesome beverage that can be added to any other manufactured article of food."

In DENMAN'S work, on the Vine and its Uses, there are abundant quotations from eminent travelers, physicians, and others, in wine-growing countries, all going to prove that where the vine is found in most abundance, there is no intemperance; that the people are healthy, temperate, thrifty, and cheerful.

E. W. BULL, of Massachusetts, says: "A clergyman of this State, who passed two years in France for his health, going all over it, for the most part on foot, told me that in all the wine districts he found temperance, but the moment he got into those districts where the grape could not be grown, where they drank beer and brandy distilled from the potato, and from beet-waste, there he found intemperance immediately. And that is the universal testi-

mony. Now, all the world will have stimulants, for necessities; for debility arising from sickness or age, or that form of disease—if it is a disease—dyspepsia, where you can not digest your food. Physicians prescribe stimulants, and until an abundant supply of wine is made, these noxious drinks will be used. It seems to me that it is not only better for us to use wine, but better for the cause of temperance. Since it is certain that stimulants must be had, it would seem to be wise to supplant those which we have, which lead to intoxication, and have a wholly different effect upon the system from pure domestic wines, by wines made in our own land. They will be light. Wine can not be transported unless it is strong, and therefore the foreign wines are strong."

According to Mr. HUSMANN, of Missouri, although the Catawba, Clinton, Isabella, Concord, and many other varieties, begin to color pretty early in the season in the Northern States, yet they are seldom permitted to hang on the vine long enough, on account of the early frosts of Autumn, for the acid center of the fruit to dissolve, and fully mature for good wine. "The longer a grape hangs on the vine the more its watery substance evaporates, the acid diminishes, and the sugar increases. Much of the Catawba, Clinton, and Isabella wine made at the North and East, wanting in this maturity, has an unripe taste, and but little flavor. They should, in those sections, confine themselves to such early ripening varieties as the Delaware, Creveling, and the Massasoit, or Rogers' No. 3, from which, I am sure, they can produce good wine."

Inasmuch as the temperate zones of Europe produce the most highly-flavored wines—the fine German and French wines, for their delicate fragrance, are the universal favorites of the civilized world—hence Mr. HUSMANN sets forth that the same rule seems to apply to this country; that he has not found the California wines of really fine flavor; that while the hot and arid climate of California and Mexico may yield a great quantity, yet in quality they can not compete with the West—Missouri, Illinois, Arkansas, and perhaps parts of Indiana and Ohio, which alone are destined to produce the wines that will be the pride and boast of the nation.

With healthy varieties, which will yield a certain return every year, we can make wine so cheap that it will become the beverage of the masses. If we can count upon 1,000 gallons to the acre per year, we can much better

afford to sell that wine at fifty to seventy-five cents per gallon, than we can sell wine of a variety which yields but 250 gallons at \$1 50. The labor is nearly the same, and the capital it yields is larger. We want good wines for the laboring classes at low figures, and of these we should grow the greatest bulk.

North and South, East and West, ours is destined to become an immense wine-producing country; and this is especially true of California and the Western and Southern States. The best varieties of European wine-producing grapes are being planted in California, and succeed well—such as the White Malaga, Black Prince, Black Hamburg, Muscat of Alexandria, Black Zinfandel, Red Traminer, Verdelho, Golden Chasselas, Royal Muscadine, White Nice, and others. Not only will California and the Western States be able to supply the home demand for good wines, but they will, in time, come in vigorous competition with the wines of Europe in many foreign markets. At the great Paris Exposition, when the Foreign Commissioners examined specimens of wines made in our Western States, they had the liberality and honesty to say, "If you can raise such grapes and make such wines in your country, you want none from us."

The census of 1860 shows that over 1,600,000 gallons of native wine were then made in this country—fully twelve times as much as was made in 1840. It is said that the Buena Vista vineyard, in Sonoma county, California, is the largest in this country, if not in the world—containing 6,000 acres, with 722,000 vines planted previous to 1865, and 75,000 additional ones in 1866. The yield of that vineyard in 1865 was 42,000 gallons of still wine, 60,000 bottles of sparkling wine, and 12,000 gallons of brandy. In that State about 1,000 vines are planted to the acre, and after four years these vines yield five to six hundred gallons—while one hundred and seventy-five gallons to the acre are the average annual product of the German States and France; and that of Italy four hundred and fifty gallons. The total yield of California in 1866, was, in round numbers, over three millions of gallons, the aggregate value of which was fully \$10,000,000; while the planting of vineyards is going on at the rate of at least three millions of cuttings per year, and the wine product of that State will, it is estimated, in 1876, exceed in value that of wheat and all other cereals combined. Large quantities of wine are made from the native Mustang grape in Texas; and from the Scuppernong, Clinton, and other

grapes in other portions of the South; from the Catawba, Concord, Ives Seedling, Delaware, and others, in the Ohio Valley, Lake Erie region, Missouri, and Iowa.

To make good wine, grapes must have the requisite quantity of saccharine matter, with its acid accompaniment, in a finely elaborated form; in the extreme North, where the grape does not properly ripen, good wine can not be secured—in the tropics, the grapes contain too much sugar for the purpose. Tests made in the Sandusky region in 1867 show that the *must*, or juice of the grape, increased ten per cent. for wine purposes, from the 15th of October to the 15th of November.

At the meeting of the Lake Shore Grape Growers' Association, at Cleveland, in February, 1868, a committee reported as follows on tests of grape musts: "N. LONGWORTH says: 'I would sooner pay seventy-five cents per gallon for must weighing 95, than five cents per gallon for must that only weighs 75.' He considered the percentage of must the great desideratum of grape growers who wished to make good wine. We certainly should admit the force of his argument until it is proven to the contrary. Our tests have been made with care, and we hope the following report will be of interest to you all:

When Pressed.	DELAWARE.	Secul of Oscillat. S.	SUGAR.....	Acid.....
Oct. 16—JOHN HOYT, City.....		93	21.07	5
16—GEORGE LEICK, Euclid Ridge....		116	20.04	4
18—DOVER BAY WINE COMPANY.....		111	23.07	4½
19—FORD, East Cleveland.....		119	25.06	4½
21—DR. DUNHAM, Euclid Ridge.....		111	26.00	4
CONCORD.				
Oct. 19—FORD, East Cleveland.....		78	17.08	4
21—DOVER BAY WINE CO.....		80	18.03	3¾
21—DR. DUNHAM, Euclid Ridge.....		84	19.04	3½
ISABELLA.				
Oct. 21—DOVER BAY WINE CO.....		92	21.04	5
21—ATWELL, DOVER BAY.....		76	17.02	6¼
CATAWBA.				
Nov. 1—DOVER BAY WINE CO.....		95	22.02	5
2—BOYD, AVON POINT.....		92	21.04	5½
11—D. NEWTON, Catawba Island....		93	21.07	5½
12—DR. DUNHAM, Euclid Ridge.....		100	23.04	4¾
12—GEORGE LEICK, Euclid Ridge....		104	23.07	4¾
12—FORD, East Cleveland.....		93	21.07	6
CLINTON.				
Nov. 12—DOVER BAY WINE CO.....		101	23.07	6
DIANA.				
Nov. 9—DOVER BAY WINE CO.....		91	21.02	6
12—FORD, East Cleveland.....		96	22.05	6½
NORTON'S VIRGINIA.				
Oct. 26—JOHN HOYT, City.....		97	22.07	6
Nov. 1—GEORGE LEICK, Euclid Ridge....		99	23.02	4¾
IVES.				
Nov. 1—DOVER BAY CO.....		87	20.02	5¼

While such facts as these, showing the relative saccharine and acid properties of the different kinds of grapes, are important, it is also

important to approximate the quantity of wine that can be produced from the grapes grown upon an acre. It would be difficult to cite another case like the single Scuppernong, covering an acre, from which sixty barrels, or eight hundred and sixty gallons, of wine are said to have been made in a single year; yet we have the good authority of A. E. THOMPSON, of Hillside Vineyard, near Cincinnati, who has sixty acres of vines, that the Concord will yield from eight to ten hundred gallons to the acre; Ives' Seedling from five to seven hundred gallons; and the Delaware from three to four hundred gallons. The wine product of three acres of Ives' Seedling and the Delaware, sold at four dollars and twenty-five cents per gallon, at Cincinnati, or over two thousand dollars per acre.

The following recommendation was made by Drs. J. A. WARDER and H. SCHROEDER, at the Illinois Horticultural Society, in 1862: "We beg leave to present the following list of grapes for the preparation of wine without sugar—except in Northern latitudes, if absolutely needed:

Catawba, for White Wine, of high flavor.

Delaware, for White Wine, of very delicate and delicious character.

Herbemont, for White and Red Wine, of high character.

Norton's Virginia, for abundance of a very rich Red Wine.

Clinton, for abundant dark Red Wine, of great promise.

Concord, for a Red Wine in great quantity, and of fair quality—promising very well.

GEORGE HUSMANN, of Missouri, gives the specific gravity of the must, from the following different varieties of grapes, according to the Must Scale; and, it may be added, that from seventy to one hundred degrees, varied by the season and kind of grapes, is a very good must, and will make excellent wine, if rightly handled during the fermenting process, and after-treatment:

Arkansas.—Closely resembles the Cynthiana, and will make superior wine.

Brown.—Makes a red, light, but pleasant wine.

Cassady.—Must, 95 to 105; a delightful wine, of pale straw color, great body, and exquisite flavor; the best purely white American wine I have yet tasted—equal to the best Hock wines, if not superior. As this variety has considerable acidity, about a gallon of water and two pounds of best crushed sugar should be added to each pailful of mashed grapes.

Catawba.—Must varies from 75 to 95, according to season; makes a good still wine, resembling Hock, but with strong native flavor, and a good deal of astringency. The best method is to add to the grapes, after they have been mashed, about one-third water—that is, fifty gallons of water to one hundred gallons of juice, and at the rate of two pounds best crushed sugar to a gallon of water—if the grapes be very ripe, add less; if very unripe and acid, add more sugar and water.

Clinton.—This grape contains a great amount of acidity, and also a great deal of sugar. It needs water and sugar, about like the Catawba; it will make very good claret, with a peculiar frost-grape flavor, which many like. Specific gravity 98 to 105.

Concord.—Must 78 to 90; makes a very agreeable light wine, of a brilliant color. It very nearly resembles some of the Hungarian red wines, and has become a universal favorite. The best wine is made from it by adding one-third water, and sugar, as in the case of the Catawba and Clinton, making a light red wine of pleasant strawberry flavor, which will much improve by age. This wine can be produced so cheap that it may become the laboring man's drink, in place of whisky and beer; it is very palatable, and imparts a peculiar invigorating effect upon the system.

Creveling.—A small sample made of this grape has given me a very high opinion of its quality for wine. It supplies a want long felt among the wine-drinking public of a wine intermediate between the Concord and Norton, and of more delicate flavor. It resembles the choice clarets of France, with perhaps not so much astringency. I do not think this needs any manipulation to produce a good wine. Specific gravity 88.

Cunningham.—Must 100 to 112; makes a delicate wine, which often remains sweet after fermentation; it is a heavy, spicy, fragrant wine, of a dark yellow color, which many prefer to the Delaware. One-third addition of water, with sugar, will, I think, improve it.

Cynthiana, or Red River.—Must 110 to 125; it closely resembles Norton's Virginia; wine not quite so dark; it is of the same or even greater body, delightful aroma, spicy, and much smoother than the Norton—and altogether the best red wine produced in the country.

Delaware.—The must of this grape is generally so rich, and the proportions so evenly balanced, that it will make a first class wine, of great body and fine flavor, without manipula-

tion or addition. It is, perhaps, the perfection of the Hock or Rhenish wine type among our natives, and will compare with any of the imported wines, if well and carefully made. Must 105 to 120.

Diana.—Said to make very fine wine; never tried it.

Gæthe, or Rogers' Hybrid No. 1.—This makes an excellent white wine here, where it fully ripens, although at the East it would hardly do so. It has a good deal of flavor, a good deal of pulp and acidity, and therefore needs Gallizing about like the Cassady. If thus managed, it makes one of the finest wines we have, of very delicate flavor, smooth and rich. As it is also very productive and healthy, it will become a very popular wine grape here. Specific gravity, 78.

Hartford Prolific.—This, if well made, resembles the Concord closely, and though hardly a true wine grape, can still be made into wine advantageously where the fruit can not be marketed well. It may be treated like the Concord, and will then make a fair red wine.

Herbemont.—Must, about 90; makes a very delicate white wine, if the grapes are pressed without being mashed; and the pure juice, if treated in this way, more nearly resembles a delicate Rhenish wine than any other we may have; it has a good deal of body, and is aromatic and spicy.

Isabella.—Makes only an apology for wine.

Ices' Seedling.—I can not speak from experience in regard to this variety, as I have never made wine from it; and although I have tasted a good many samples made in Ohio, I have been unable to accord it the high rank our Ohio friends claim for it. It has a pleasant flavor, but a great deal of acidity and harshness, an unripe taste, if I may so express myself, which is not at all pleasant to me. Perhaps by Gallizing judiciously—that is, adding sugar and water—a better wine may be made from it than I have yet seen. So far, I can see nothing in it which should induce me to prefer it to good Concord, and it certainly does not produce as much per acre, from all I can learn.

Lenoir.—Must, 95 to 105; makes a fine, brilliant red wine, of great body, and Madeira flavor.

Lindley, or Rogers' Hybrid No. 9.—This also makes an excellent wine; does not, perhaps, need Gallizing to the same extent as the Gæthe, but an addition of one-third will much improve it. It is an excellent substitute for the Catawba, and, as it is healthy and hardy and very

productive, it will, doubtless, soon take its place. Specific gravity, 80.

Louisiana.—Must, 95 to 105; makes an excellent pale, red wine, very heavy, with a delightful aroma.

Martha.—This is, perhaps, our most valuable grape for white wine, as the vine has all the good qualities of its parent, the Concord, and makes a delightful white wine of fine flavor and good body. It seems to succeed everywhere, and would make a fair wine, even farther north, as it ripens early. Should be Gallized one-half. Specific gravity, 92. The first wine made of it last Fall has far surpassed my expectations, and as it is very productive it will soon become one of our leading wine grapes.

Mazatawney.—But little wine has been made of this, our best healthy out-door grape of white or rather amber color. What little I have made leads me to the belief that it will make a very delicate white wine, without Gallizing, and as it seems very productive, and ripens thoroughly here, it will, no doubt, be largely planted for that purpose. Specific gravity, 82.

North Carolina Seedling.—This is another very decided native, which may perhaps properly be called Muscatel. It has a tough, acid pulp, and strong flavor; but will, if Gallized one-half, make a wine which has met with universal favor and brings a high price in market. It is very healthy, a strong grower, and immensely productive. Specific gravity, 84.

Norton's Virginia.—This wine has already acquired a world-wide reputation, and is, no doubt, the best wine for medicinal purposes we now have. The juice, when fully matured, will safely bear comparison with the best Port, having the advantage over the latter that it has no addition of alcohol. It is the great remedy here for dysentery, and diseases of the bowels, and even cases of cholera have been cured with it. It is of a dark color, resembling Burgundy, and improves with age. Specific gravity of must, 100 to 120.

Oporto.—Not favorably impressed by it; think the Clinton is better.

Rulander.—This is not the German grape of that class, but as I think a Southern variety, closely related to the Herbemont and Cunningham. It makes a pale red, or rather brownish wine, of great body and fine flavor; should be about one-third Gallized. It resembles Hock. Specific gravity, 100 to 110.

Taylor's Bullitt.—Must, 90 to 100; makes an excellent white wine, which by many is preferred to the Delaware, but is rather unpro-

ductive. It may be treated in the same manner as the Delaware, having the same body, but a different flavor."

At the Golden Bluff Vineyards of A. H. & G. B. WORTHEN, Hancock county, Illinois, October 1, 1866, the following specific gravity of must was tested; Delaware, 100; Clinton, 96; Taylor's Bullitt, 90; Catawba, 86; Concord, 83; Oporto, 73; and Isabella, 72.

At a recent New York State Fair at Buffalo, while the best out of a dozen samples of Catawba marked 88, three specimens of Iona reached respectively, 88, 90, 92; while five samples of Delaware ranged from 87 to 103.

The Alcohol of Wines.—Wine calculated for daily use should not contain more than from 8 to 12 per cent. of alcohol (spirit of wine), nor over 5 to 6 per cent. of acid; and as one out of two parts of sugar is converted by fermentation to alcohol, 100 parts of the must of the grape should contain from 5 to 6 parts of acid, from 16 to 24 parts of sugar, and from 70 to 79 parts of water. Many persons erroneously suppose that such domestic wines as are made from currants, gooseberries, or elderberries, are very innocent as compared with pure grape wines. We give the following statement of the amount of alcohol contained in several vinous and other drinks—varying somewhat in different specimens, yet giving very nearly the average: Currant wine, 20 per cent. alcohol; porter, 23; champagne, 12; gooseberry wine, 12; elderberry, 9; cider, $7\frac{1}{2}$; ale, 7; and the light Rhine wines, $4\frac{1}{2}$.

How to Make Wine.—W. O. HICKOK, of Harrisburg, Pennsylvania, than whom perhaps no person is better qualified to speak on this matter, gives the following method, which is only designed for home manufacture: "Pick the grapes off the stems when fully ripe, rejecting the bad ones. Pass them through the wine-mill to tear open the skins, but not to bruise the pulp. Press moderately, then get all that remains in the must from which to make brandy or an inferior sour wine. Strain and fill into clean barrels; then insert a bent tube tight in the bung, and let the lower (outside) end rest under the surface of water in a bucket, so that while all the gas shall escape, the air will not get into the wine. When it has done fermenting, rack it off into clean barrels, bung it up, and set it in a cool place—bottle it in a few months. The great secret of making good wine is to select only the best grapes, and not press out the sour portion of the pulp. Noth-

ing is here said about the numerous mixtures of water, sugar, and grape juice, which are frequently concocted, and sold under the name of wine, but only of the pure juice of the grape, properly fermented.

Dr. J. A. WARDER, chairman of a committee, reported at the Ohio Pomological Society, in 1866: "The grape is par excellence the wine fruit, and the rhubarb is as emphatically *not* what it has been called, a wine plant, and we hope never to be called upon to examine specimens of its preparations, miscalled wines. We are more than ever convinced of the absolute necessity of having our grapes perfectly ripened before making them into wine. We recommend the greatest attention being paid to perfect cleanliness in all the operations. We also wish to express our objection to the practice of using any foreign ingredients in the preparation of wines from our grapes. We think the grapes should themselves furnish sufficient sugar to make them strong enough; and that we should not aim to make strong wines, but rather light ones, with spirit enough to keep them from acetous fermentation. Hence, all wine makers are encouraged to prepare these fluids in their perfect purity."

On the other hand, Mr. HUSMANN thus advocates the process of using sugar and water to deficient must: "Shall the must be left as nature gave it, or shall sugar and water be added? This question has of late called forth a good deal of discussion; one party claiming that nature makes the wine, and the juice of the grape should be left just as nature gives it, without any manipulation or addition whatever. The other, that nature furnishes the *raw material*, but that wine is an artificial product, which requires all the skill, guided by reason, of which the maker is capable.

"The latter is evidently the most reasonable view. My ideas about this question may be given in a very few words. If nature furnishes me with the grapes, which I intend to make into wine, a juice which contains everything to make first-class wine, in the right proportions, I shall leave it so, on the principle, 'let well enough alone;' but if I think there are deficiencies which can be supplied by adding to that which is already in the must, but not in sufficient quantity, I shall do so, as my reason was given me by an All-wise Creator for the purpose of using it to the best advantage. All grape juice contains, in larger or smaller proportions, sugar, water, free acids, tannin, gum-coloring matter, and fragrant, or flavoring substances.

A good wine should contain all these ingredients in due proportions. The saccharometer will show me the amount of sugar contained in the must; the acidimeter, the amount of acid it contains. If I find that the must does not contain sugar enough, and an excess of acid, what can be more natural than to add the sugar, and to dilute the acid by adding water? Both are ingredients of the grape; where, then, can be the harm of adding them, until the proportion is attained? But this is not all. Many of our native grapes contain an excess of aroma as well as an excess of acid. If, by a proper manipulation, this also can be toned down, so as to be pleasant instead of offensive, it is an improvement, not an adulteration, and such a wine is certainly pure, and more wholesome than the simple juice of the grape, with its excess of acid, tannin, and aroma, would have been.

"Let not the reader misunderstand my position. We can only make the best wine in the best seasons. We can add sugar to the product of poor seasons, and dilute the acid by water so as to bring the must to its normal alcoholic standard; we can thus *always* produce a pleasant and drinkable wine, but the exquisite flavor developed in the grape, in the best seasons, we can not make."

The successful manufacture of grape wine on a large scale is an art not easily described, and not acquired in a single season. Grapes have different qualities—varying, more or less, in different localities, and different seasons—and hence, require different treatment to convert them into the best wine they are capable of making. Hence, general rules only can be of any material service; an experienced eye, and nicely discriminating taste and judgment, will be in constant requisition from the gathering of the grapes, separating, mashing, fermenting, barrelling, and bottling, to its final ripening in the cellar. Mr. HUSMANN has described these several processes in detail in his work on "Grapes and Wine."

A Grape Grower's Maxims.—ANDREW S. FULLER, an eminent horticulturist, and author of *The Grape Culturist*, furnishes these practical maxims, with which we appropriately close the subject of grape culture:

1. Prepare the ground in the Fall—plant in the Spring.
2. Dig deep, but plant shallow.
3. Give the vine plenty of manure, old and well decomposed; for fresh manure excites the growth, but does not mature it.

4. Luxuriant growth does not always insure fruit.

5. Young vines produce beautiful fruit, but old ones produce the richest.

6. Prune in Autumn to insure growth, but in the Spring to promote fruitfulness.

7. Plant your vines before you put up trellises.

8. Vines, like soldiers, should have good arms.

9. Prune spurs to one developed bud, for the nearer the old wood the higher flavored the fruit.

10. Prune short, or learn how to climb.

11. Vine leaves love the sun, the fruit the shade.

12. Every leaf has a bud at its base, and either a bunch of fruit or a tendril opposite to it.

13. A tendril is an abortive fruit bunch—a bunch of fruit a productive tendril.

14. A bunch of grapes, without a healthy leaf opposite, is like a ship at sea without a rudder—it can't come to port.

15. Laterals are like politicians; if not checked, they are the worst of thieves.

16. The earliest grape will keep the longest, for that which is fully matured is easily preserved.

17. Grape eaters are long livers.

18. He who buys the new and untried varieties should remember that the seller's maxim is, let the buyer look out for himself.

Strawberries.—This is the only fruit which grows in every clime. ISAAC WALTON said: "Doubtless God could have made a better berry, but doubtless God never did." Mr. DOWNING says: "The strawberry is perhaps the most wholesome of all fruits, being easy of digestion, and never growing acid by fermentation, as most other fruits do. The oft-quoted instance of the great LINNÆUS curing himself of the gout by partaking freely of strawberries—a proof of their great wholesomeness—is a letter of credit which this tempting fruit has long enjoyed, for the consolation of those who are looking for a bitter concealed under every sweet."

April and September are the two months in the year in which strawberries are usually set out, as may best suit the convenience of the planter. If set in the Spring, the blossoms should all be picked off the first season to prevent the plants from exhausting themselves. Choose a deep, rich spot, moist but not wet, and have, if possible, a northern exposure; for

strawberries, while ripening require an immense amount of water, and early frosts effect less damage on northward slopes.

Some strawberry growers recommend the old plan of planting in beds, in rows a foot or fifteen inches apart, and setting the plants twelve inches from each other in the rows; some contend that the rows should be two feet apart; and others, still, advocate putting them three feet apart, and the plants two feet asunder in the rows.

The plan of a strawberry bed, and its treatment, for many years most successfully tried by Dr. JOSEPH HOBBS, at Madison, Wisconsin, is worthy of imitation. His plan is to dig a trench two feet deep, for the dry climate of the Northwest, and as large as may be desired. Place in the bottom a layer of some five or six inches of well-rotted, rich manure; then put on the top soil, and fill up to the top with the subsoil dug from the bottom of the trench. Place in this the strawberry plants not less than eighteen inches apart both ways. Dress the bed twice, during the Fall between the rows, with a coating of wood ashes; and for Winter covering, put on an inch and a half of straw, with long sticks to keep it from blowing off—thus giving proper ventilation, and not heating and destroying the plants, as a heavy litter or manure covering is apt to do. This straw may be removed from the plants in the Spring, and left as a mulch between the rows during the Summer. Or, what is much neater, rake off the straw in the Spring, and substitute as a mulch between the rows the first cutting of grass from your lawn, two inches deep, which not only serves as a mulch, but keeps down the weeds, and if properly placed around the plant will keep the fruit free from dirt, and protect the clothing of those engaged in picking the fruit. Runners should be carefully taken off as fast as they appear, that the strength of the plants may not be wasted upon them. No top dressing is needed; but a new bed should be made in a new place every third year. Such a strawberry bed will yield a plentiful harvest. In 1865, the third year of bearing, Dr. HOBBS' bed, twelve by fifteen paces in size, of Wilson's Seedling, produced nearly five hundred quarts—or at the rate of nearly 13,000 quarts, or four hundred and six bushels per acre.

Of late years, hill planting has been highly commended. A. M. PURDY, the well-known nurseryman, of South Bend, Indiana, says: "We have heretofore strongly advocated the

matted row system, but after careful and practical comparisons, we are satisfied that the hill method is the best, one year after another. The fruit averages *double* the size—the crop *double*, and, on most soils, with *less* labor. In hills they form such strong bushy tops, that the fruit and blossoms are protected from severe late Spring frosts. Last Spring we had a late frost in May, that nearly ruined our plantations that grew in matted rows, while those grown in hills were but slightly damaged, and yielded a very heavy crop. Another reason is, that the heavy tops mat down around the crown in the Winter, and protect it from the action of the frost, while those grown in the matted row form but small tops and are not thus protected. Again, if the ground should be weedy, they are attended to with much less work and care than if allowed to throw out runners. The work can nearly all be done with the hoe and cultivator, while if in matted rows, it must be done with the fingers, which is very laborious indeed." He adds, "that the only case in which the matted row method is admissible, is where the land is quite free from weeds and is not liable to severe frost in Winter or Spring, and that while all varieties will do better grown in hills, some will not succeed in any other way. As soon as the hills are through bearing, rotted manure or compost is plowed or spaded deep between the rows, and in addition to cutting off all the runners that are starting, the entire top of the plant is taken off close to the crown. This is deemed very essential—preventing the plant from remaining in a dormant state for weeks, and causing new roots to be thrown out immediately, and making a large mass or stool by Autumn." In hill culture, sawdust and old tan-bark have been recommended as a Summer mulch between rows; and spent hops from the brewery, have been used with excellent effect.

Where strawberries are raised on a large scale for market purposes, it can not be supposed that beds can be made as described by Dr. HOBBS; the plants must be put out in soil and locality best suited to them. PARDEE'S Manual on the strawberry advises that, "as the fruit is composed of so large a proportion of potash, soda, and lime—sixty-two parts in every hundred, as the analysis shows—we recommend that an application be made of twenty or thirty bushels of unleached or leached ashes, ten or twelve bushels of lime—either stone or oyster shell—with two or three bushels of salt, to the acre, thoroughly mixed

with the soil, if possible some weeks before the plants are set out, and the ground frequently worked with spade or fork, before planting, and stirring up with a long-toothed rake afterward as long as it can be done without disturbing the roots.

"About the first of May, and again ten days or two weeks later, three times each Spring, liberally sprinkle your choicest beds with a solution in six gallons of soft water, of one quarter of a pound each of sulphate of potash, glauber salts, and nitrate of soda, with one and a half ounces of sulphate of ammonia. We would not represent this application to be essential to the production of good fruit, but the apparent effect seemed to be to arouse the plants from the torpor of Winter, and give them an early and vigorous impetus, which resulted in increasing the size, quantity, and superiority of the fruit. By this treatment the bed will remain in good condition much longer than it otherwise would."

A Pennsylvania strawberry grower suggests that the land is generally made too rich for the production of this delicious berry, and says that more depends upon the *kind* of soil and manure than upon the *quantity* of manure used. On a lean, tenacious soil, there is no danger in the application of too much barn-yard manure with a liberal mixture of wood ashes. On a sandy loam, characteristic of a great deal of our prairie soil, we should increase the proportion of ashes at the expense of the manure. On a black loam, rich in vegetable deposit, we should use ashes liberally with little or no manure.

Strawberries, says Dr. WARDER, have a peculiarity in their blossoms, from which they have been classified as *pistillates*, *staminate*s, and *hermaphrodites*, or perfect flowered. In the first class the stamens are so defective that the flowers need the fertilizing influence of other kinds, which must be planted near them. These pistillates furnish many of our favorite varieties, especially those that are cultivated in beds—such as BURN'S New Pine, Extra Red, Fillmore, Hovey's Seedling, Necked Pine, Russell, and Superior. The next class, the staminate, embraces most of those sorts which produce the largest berries, though their flowers are often so deficient in the pistils that a large percentage of them fail to produce perfect fruit. This is particularly the case when these varieties are grown in beds, and allowed to multiply their runners. They are, however, quite productive when cultivated in hills, where

they form large bunching crowns from which spring numerous trusses of flowers—of this class are the Austin, Dr. Nicaise, Golden Seeded, Jucunda, Victoria, and Washington. Besides these two classes, there is another, the hermaphrodites, in which the two sexes are so evenly combined, and so well developed, that almost every flower is followed by a well formed and perfect fruit. This is a small class, as very few varieties of the strawberry, either wild or cultivated, belong to it—among them are the Agriculturist, Wilson's Albany Seedling, and the Longworth.

While LONGWORTH and some others claim that the pistillate varieties are the most productive, others prefer the hermaphrodite sorts, which fertilize themselves.

Hybridization of Strawberries.—Strawberries never hybridize, or mix in varieties, when grown together. You may set any number of varieties side by side, and the fruit of each will be as distinct, from year to year, as if they were a mile apart. If hybridization can be effected at all, which is doubtful in our opinion, it can only be shown in seedlings. That is, by mixing the fructifying pollen of the blossoms of two varieties, and sowing the seeds grown from such varieties, and producing new varieties therefrom, it is contended by some persons that a hybridization does take place. If that be so, all seedlings are the result of hybridization, as honey bees mix the pollen of varieties, in gathering it, as thoroughly as could be done by the hand of man.

Mounds for Strawberries.—An advantage can be gained by those having only a small piece of ground, to raise mounds three or four feet high for strawberries, and plant the vines upon them, and cover the spaces between the plants with thin flat stones, bricks, or something similar, to prevent washing, and serve as mulching for the plants. Covered smoothly and evenly it would present a handsome surface, similar to pavement; it would keep the soil moist about the roots of the plants, preserve the fruit clean from dirt, facilitate the ripening of the fruit upon the south side, and retard it upon the north, thus extending the strawberry season to a longer time. The picking would be more convenient than upon a level surface; the roots of the plants would have a deeper and more mellow soil to extend in, and thus combine many advantages, ornamental and useful, over the level culture. Mounds well paved over the surface would be likely to last many years.

Fall Growth of Strawberry Roots.—After the

fruiting season is over, dress the rows down to about six inches in width, with sheep shears, or a sharp wheel run along the side of the row, and thus prepare them for the next year's growth. Select a plant that has just borne fruit, pull it up, and you will see that every root is dead. As soon as the berries begin to ripen, the roots did their very best, and gave all their life to the fruit. But the crown or heart of the plant enfolds the elements of a new set of roots, and with prompt and kind treatment, she will develop them into a healthy being; feed her as you would a generous mother, for this is her time of need. Unless the earth is rich enough to develop the new roots in the Fall, the next crop will come feebly to the birth, or not at all. This peculiar physiological condition of the strawberry plant, is the reason why the early Fall is the best time in the year for transplanting, as well as for working over the old beds. When the beds are put in order, give them liberal drafts of liquid manure, and a mulching of fine straw or spent tan-bark upon the surface, to prevent evaporation, and the plants will go right-ahead and establish themselves for next year's crop.

Product of Strawberries.—In seven townships in New Jersey, where, in 1866, there were eight hundred and fifty-seven acres in cultivation, the average yield was a little over twenty-nine bushels per acre, bringing, upon an average, \$5 81 per bushel, or a little over \$169 per acre. It was an unproductive year, some fields, however, yielding as high as seventy bushels per acre. NICHOLAS OHMER, near Dayton, Ohio, having five acres of strawberries, chiefly WILSON's Albany, raised, in 1867, about one hundred and twenty-five bushels to the acre, realizing for the crop, \$1,900. From half an acre of land, Mr. AMES, of Beaver Dam, Wisconsin, sold berries of WILSON's Albany Seedling variety of one year's product to the amount of \$452—getting, previous to July 5th, twenty-five cents a quart, after the 5th, twenty cents a quart, and twelve cents on the vines. He mulched heavily with straw between the rows. A farmer near Ottawa, Illinois, picked from an acre of WILSON's Albany, between the 5th and 30th of June, one hundred and eight bushels, besides what he consumed in his family, and realized \$731 20—paid \$69 12 for picking, leaving the net proceeds of the acre, \$662 08. Professor T. H. BURGESS, of Ulster county, New York, stated at a meeting of the New York State Agricultural Society, that the Triomphe de Gand had sold at the highest rates

of any strawberry, or over forty cents per quart; that the product of the best plantations has been from fifteen hundred to two thousand quarts, and had yielded \$800 or \$900 per acre; that the heaviest product and largest sum he had known from a given area, was obtained from a small patch one plant to a square foot, the runners being well clipped—yielding a pint to each plant, and at the rate of about \$4,000 per acre. A prominent fruit grower of western New York, raised thirteen hundred bushels of strawberries from sixteen acres of ground, or eighty-one bushels and a peck to the acre, selling them at an average price of twelve and a half cents per quart, realizing the total sum of \$5,200, or \$325 per acre. Captain ANDERSON, at a recent meeting of the Western Fruit Growers, at Cincinnati, stated that he had raised as many as seven thousand quarts per acre; that, under some circumstances, he had averaged one quart to the plant, and that they would realize from \$2,000 to \$2,500 per acre. He practiced the stool or hill system, and planted two feet apart each way. O. J. WEEKS, who had planted WILSON's Albany in rows three feet apart, and fifteen inches in the row, had raised about three hundred bushels per acre, or about nine thousand six hundred quarts. These various results show the difference in soil, climate, location, and treatment, and should prove an encouragement to others to strive to emulate the most successful of these examples.

PRINCIPAL STRAWBERRY VARIETIES.

Agriculturist.—An admirable variety for sandy or poor soils, but not so good for rich ones; succeeds well in the Northwest, and is a delicious fruit for home use. Very popular in all parts of the country; of a rich aromatic flavor.

Barnes' Mammoth.—A new hermaphrodite variety; as firm as WILSON's Albany, of much larger size, about the same color; flavor, spicy and rich. Very promising, especially for market purposes.

Boston Pine.—Staminate; requires high cultivation; fruit early, large, shining red, juicy and sweet. Early and productive.

Boyd's No. 30.—A new seedling, by SETH BOYDAN, the originator of the famous Green Prolific—and claimed to be superior to that

well proved, reliable sort, in every respect—high praise.

Brooklyn Scarlet.—Plant, hardy and vigorous; fruit, good size, bright scarlet, with long neck; flavor delicious and highly perfumed.

Brighton Pine.—Only medium in size, but one of the best market sorts; hardy, early, and abundant.

Burr's New Pine.—A pistillate, of large size and fine flavor; hardy, vigorous, and productive—too tender for market.

Charles Downing.—A seedling from Downer's Prolific, claimed by all who have fruited it to be superior to that well-known and reliable variety. Originated with Downer, in southern Kentucky.

Colfax Strawberry.—A seedling, cultivated for fifteen years by Hon. SCHUYLER COLFAX, at South Bend, Indiana; of vigorous growth, far more so than Wilson's, often taking a half bushel measure to cover a plant the second year; it is hardy and productive, yielding fruit of excellent size and flavor. It seems to get along with less care than other varieties.

Crimson Cone.—A pistillate; vine, vigorous and wide-spreading, productive; berry, beautiful in appearance, large size, fine color, and medium flavor.

Crimson Favor.—CHARLES DOWNING has said of this new variety, that he thought it would prove very large, very early, and of good flavor, but not very productive.

Downer's Prolific.—Hermaphrodite; does exceedingly well in many localities, adapting itself well to soils and situations; ripening early, and bearing profusely, well up from the ground, rather acid; but, being very soft, will not bear transportation.

Dr. Nicaisse.—Fruit of enormous size, early, of a bright red color, very glossy, of the first quality; some of the berries measuring six and a half inches in circumference, and weighing from one ounce and an eighth to an ounce and three-quarters.

Early Scarlet.—Hermaphrodite; early, hardy, and prolific. Fruit bright scarlet, rich, and slightly acid flavor. It is a fine variety to serve as an impregnator of pistillate kinds.

Early Washington.—Hermaphrodite; a fine market fruit, on account of its hardiness, earliness, and productiveness; fruit, medium size; flavor, fair; color, orange scarlet.

Fillmore.—A pistillate; very productive, good flavored, red-fleshed berries, very near the ground; hardy in hot weather, the fruit hangs

long, and carries well to market; and is a good variety to follow earlier kinds.

French's Seedling.—This is a fine, early variety, and produces well in the Northwest.

Genesee.—Luxuriant, very productive, stout vines, supporting well the fruit, which is large, dark crimson, and ripens late.

Golden Queen.—Hermaphrodite; a great yielder of rich, golden-colored fruit, late in the season—similar to Trollope's Victoria, but far more prolific; very large, twenty choice berries having filled a quart measure, and not over fifty on an average.

Golden Seeded.—It is distinct from the Triomphe de Gand, though some have confounded the two; plant a little tender to the frost; berries large and conical, on rather sharp stems.

Green Pine Apple.—A vigorous grower, a poor bearer, of a very peculiar flavor.

Green Prolific.—A fine, hardy plant, very productive; stems high and strong; fruit large, of a beautiful light orange-scarlet color, and of moderate flavor. The yield is enormous, North and South, never sunburns, and seldom winter-kills. An excellent market fruit, and suited to the Northwest. It is steadily growing more and more in favor.

Hooker's Seedling.—Hermaphrodite; vines vigorous, hardy, and productive; fruit dark crimson, sweet, rich, and excellent, ranking with the best.

Hovey's Seedling.—Pistillate; vines vigorous, and when well-fertilized and well-impregnated, is still a very desirable kind, and will yield immense crops of large, fine, sweet fruit. It requires a rich, deep, loamy soil. It is too tender for the Northwest.

Hudson.—Pistillate; very largely cultivated in some localities; distinguished for its hardiness, and late period of maturity, together with its fine, rich, acid flavor, so valuable for preserving. Succeeds well in the Cincinnati region.

Iowa, or Washington.—Staminate; a wonderfully productive variety, good size, and well adapted for the market. It lacks high flavor, and is yet a very early, and very good strawberry.

Jenny Lind.—This is regarded as better than the Early Scarlet, the two earliest in the season; a hermaphrodite; productive; fruit a bright scarlet, rather solid, tender, juicy, pleasant subacid, and sometimes highly perfumed.

Jenny's Seedling.—Pistillate; a rather late variety; fruit dark, rich, glossy red; vines hardy; good for general cultivation, and de-

sirable for preserving; very productive, 3,200 pounds gathered from less than three-fourths of an acre.

Jucunda.—Hermaphrodite; late variety, coming fully ten days after the Wilson's are gone; large, showy, and of moderate flavor, ten or twelve filling a pint measure, and they carry well to market. In the region of Rochester, New York, and northern Indiana, and in Ohio and Pennsylvania, they have done well, also in portions of Wisconsin; but generally in the Northwest, when the berry has proved to be large, it has been hollow, and in quality and quantity not the best. This is the same as "Knox's 700."

Kramer's Seedling.—A seedling of Wilson's Albany, originating in Iowa; hardy, standing the Winters there without protection; fruit sweet and rich, equal to Hovey's or Wilson's in size, with an unrivalled aroma.

Lenning's White.—Hermaphrodite; a hardy plant and excellent berry, and is suited to the Northwest—the best "white variety" known; very productive, highly flavored, and aromatic.

Longworth's Prolific.—Hermaphrodite; superb—a kingly berry, eminently fit to be planted and eaten; berry large size, dark rich crimson, subacid, good quality. Succeeds well in the Ohio Valley.

McAvoy's Red.—An Ohio berry, large, beautiful, and very prolific; keeps well, medium quality, subacid; plants vigorous and hardy. After twenty miles land carriage, and forty-eight hours' exhibition, it has remained the brightest and most showy of forty choice varieties in the Cincinnati market.

McAvoy's Superior.—Originated by D. McAVOY, at Cincinnati, in 1848; a pistillate variety, hardy, vigorous; fruit very large, often over five inches in circumference, rich dark color, tender, juicy, core rather open, and of coarse texture; too tender, except for short carriage distance. The Buffalo strawberry is so similar to McAvoy's Superior, as to be scarcely distinguishable from that berry.

Mexican Ever-Bearing.—Hardy, vigorous, and not liable to winter-kill, bearing from July to October. Said to have been brought from Mexico about 1861—pretty generally believed, however, to be simply the old red Alpine, which in France is very profitable and bears the Summer through.

Monroe Scarlet.—Remarkably productive, sometimes over three-score large ripe berries, of good size, on a single year-old plant, at one time, the largest measuring four or five inches

in circumference. It is a hybrid of Hovey's Seedling and the Duke of Kent, very vigorous; pistillate; fruit good, fair flavor, a long bearer, good for market, and does well partially shaded.

Napoleon Third.—Fruit large to very large, irregular, flattened, varying from oval to cockscomb shape; color handsome rose-red, shading to darker in the sun, and waxy-blush in the shade; flesh of snowy whiteness, firm, and sprightly, high flavor, with a delicate aroma; plant vigorous and healthy, and very productive, in some localities exceeding even Wilson's Albany, flowers perfect. In season, it is later than the Wilson, succeeding it, and continuing long in bearing.

New Jersey Scarlet.—This is probably the earliest kind of its large size; it comes into bearing all at once, very few being left for picking after the first—consequently popular with the marketmen.

Nicanor.—Very hardy; fruit glossy, rich, sweet, and high-flavored; having long, deep, strong roots, endures the changes of Summer and Winter with impunity, and is very prolific—commences to ripen a few days before the Early Scarlet, and continues fruiting a long time; berries from one to one and a quarter inches in diameter.

Peak's Emperor.—Hermaphrodite; very similar to Agriculturist in appearance; is hardy, and does not sunburn; fruit very large, often measuring six and a half inches in circumference, firm, very productive, and flavor excellent. It continues longer in bearing than the Wilson.

Perpetual Pine (Glade).—This is claimed to be a real perpetual strawberry, bearing a fine Spring crop, and also keeping up fruiting late in the Autumn.

President Wilder.—A new variety, hardy, robust, vigorous, and very productive—produced from artificial impregnation of Hovey's Seedling with La Constante, the latter being one of the best foreign kinds; the fruit large, many berries measuring over five inches in circumference, and weighing over an ounce avoirdupois; of a brilliant crimson scarlet; flavor rich and sprightly, inclining to sweet, with a distinct aroma of the Alpine variety. Strawberry of the highest promise. Season late.

Red Alpine.—Fruit small, bright scarlet, and of peculiar flavor. It continues to ripen for a long time, which is its chief value; and by destroying the Spring blossoms, an Autumnal crop may be secured—a fact worthy of more

general knowledge and practice. The White Alpine varies only in color from the red variety.

Romeyn's Seedling.—Hermaphrodite; this new variety has attracted great attention at the East, some claiming for it equality in every respect with the *Triomphe de Gand*, and far more productiveness on all soils; it has an immense root reaching down so deep that the drouth will not effect it. It does not winter-kill in the region of New York; fruit large size, very solid, fine flavor, bright red color, and very prolific; as many as two hundred quarts have been taken from one hundred and twelve plants, and two quarts and a half from a single plant, at two pickings!—the last being on the morning of the 9th of July. Fruit stems from a single plant, exhibited at the New York Institute, in June, numbered six hundred perfect sets. Comes into bearing very late—two weeks later than the Wilson.

Russell's Prolific.—A pistillate; very hardy, and gives the best satisfaction on rich soil, producing a very prolific crop of large and beautiful berries, borne near the ground. They command a high price in market, and Dr. HOBBS, President of the Wisconsin Horticultural Society, commends the Russell as a fine variety for cultivation for home use in the Northwest. The fruit is tender, and sometimes scorches under the rays of the sun.

Triomphe de Gand.—Hermaphrodite; this is regarded as the best of the foreign varieties, large, generally very prolific, and good—rather blunt or cockscomb-shaped, borne on long fruit stalks. It is rather essential that it should be raised in hills or rows, and not in beds, and the runners kept clipped. It requires a richer soil than some other kinds, and seems not quite so reliable, though there are occasionally seasons when, with the right kind of treatment, it beats all others, not merely in the quantity of its fruit, but in the quality; and it is, moreover, remarkable for its long-continuance in bearing, frequently supplying the table for five weeks in succession.

Victoria.—Hermaphrodite, sometimes pistillate; hardy, fruit medium to large, rich, and of a slightly acid flavor.

Walker's Seedling.—A new variety, originating with SAMUEL WALKER, ex-President of the Massachusetts Horticultural Society; well indorsed as a hardy, vigorous, good staminate, of excellent flavor, best quality, and productive—of medium season, and a "good honest fruit."

Western Queen.—Pistillate; originated with

Professor KIRTLAND, at Cleveland; fruit, a rich dark glossy-red, juicy, subacid, and of an agreeable flavor. Season medium; bears carriage well.

Wilson's Albany Seedling.—This is the "Great Commoner;" it seems to bear the same relation to strawberries that NAPOLEON's Old Guard did to his army—a reserve on which we may place the utmost dependence. It has, beyond question, been much more generally cultivated throughout our country than any other variety, and especially for market purposes. It is hardy—succeeding in the Northwest—prolific, vigorous, and reliable beyond all others; fruit, a deep crimson, tender, with a brisk acid flavor. It yields good crops, whether in hills, rows, or beds; it sometimes sunscalds in extreme hot weather, and hence it is doubtful if it will bear the heat of extreme Southern Summers. It requires Winter protection, as indeed all kinds do, in the Northwest, and on the prairies.

Strawberry Wine.—In years when strawberries are unusually abundant, or where they are too soft to transport to market, they can be made profitable by converting them into wine, adding to two quarts of juice two quarts of water, and two pounds of refined white sugar.

Raspberries.—"A good loam," says Dr. WARDER, "well cultivated, is best adapted to the raspberry plant, and will give the largest results. The only preparation requisite is ordinary plowing, but deep cultivation and manuring are well bestowed upon the raspberry patch, and it should be kept clean by thorough Summer cultivation, or the surface may be covered with mulching material.

"The raspberry may be planted in the Fall, but early Spring-time is generally preferred. The plants may be set about three feet apart, in rows that are from six to nine feet wide, or they may be planted in hills, five by five feet, or wider, for some of the larger kinds. Planting in rows is usually preferred, but the hills allow of cultivation in both directions, or cross-plowing, which saves hoeing, and also permits the pickers to get among the plants more readily.

"Trimming the raspberry was formerly done only in the Winter, and consisted in shortening the canes, and removing the old dead wood and the surplus feeble shoots, so as to leave from two to four in each hill or plant. This work was done at any mild time between October and February, or March. Fall pruning, if done too early, may prove very injurious, for when followed by mild growing weather the buds

burst and grow at the expense of too much of next year's crop. Of course, it must be understood by the pruner, that all the species and varieties of this genus, including the blackberry and raspberry, produce shoots one year that become the bearing canes of the next Summer, and then die. These shoots start from the crown of the roots. An apparent exception to this rule exists in the Autumnal-bearing raspberries, which produce blossoms and fruit upon the cane shoots the season of their growth.

"Summer pruning is now practiced by all good cultivators. This is a very simple operation, and consists in pinching or cutting off the shoots so soon as they are two feet high, which causes them to branch out with strong laterals, and these are cut back, according to their strength, in the Winter. All surplus and weak shoots may be removed at the time of the Summer pruning, and, if preferred, the bearing wood may be cut away soon after harvesting the fruit; but no good results are obtained by this, except the improved appearance that follows the removal of the dead wood, which can be more easily effected in the Winter, when we have more leisure. The Summer pruning makes the plants more stocky and bushy; they resemble little branching trees, and they are able to bear enormous crops. This method of training obviates the necessity for any kind of support, such as stakes or trellis, and the sturdy little plants are able to stand alone.

"We have two American species of eatable raspberries, the *Strigosus*, or red-fruited, and the *Occidentalis*, or thimble-berry, the black-caps, all of which have their stems recurving till they meet the ground, where they take root. Besides these we have the European species, the *Idæus*, that furnishes many delicious raspberries, most of which are tender and need Winter protection."

A cool aspect is of material consequence, and, to secure this, the north side of a fence or trellis, which will form a screen from the sun, is the most favorable; on the north side of a shrubbery, or a row of fruit trees, is also a suitable place. If neither of these situations is to be had, an open spot in the garden may be chosen, always being careful to avoid the south or east side of a fence. A temporary shade may be effected in the open garden, by planting a row of running beans on the south side. Planting a raspberry under an apple tree has been suggested.

The American red varieties are generally propagated by suckers—sometimes by seeds.

The English Reds and American Black-caps are propagated by rooting from the tips of the pendent branches. Of this class, Doolittle's Improved, is, perhaps, the best known, and doubtless many others, including native seedlings, are multiplied in the same way. The black-cap varieties throw up no suckers.

Care must be taken in planting raspberries of the black-cap family, that the young plant, which has seldom more than one well-developed germ, is not broken off. If broken in careless handling, it is not certain that the plant will die, but it is certainly put back in growth until another germ is formed, and a weak growth is the result.

The *Gardeners' Monthly* cautions those who are about transplanting raspberries and blackberries, not to plant them too deep, as most of the failures result from this cause. Raspberries and blackberries will not root out from the cane, as most things will from their stems, the buds have to come from the crown or roots, and several inches of soil to come through is too much for the buds—they will sooner die first. Mulching is very desirable.

Where trellises are required they can be cheaply made by a row of posts inserted in the ground on either side of a row of raspberries, with horizontal slats or strips nailed on the tops of the posts; or good firm posts may be placed in the ground, and two or three pieces of tarred rope, or annealed iron wire, coated with coal tar, stretched from post to post, to form a trellis upon which to fasten the bearing canes. Others simply tie to stakes.

For manure, if the soil is rich in vegetable mold, use only a slight dressing of ashes or bone dust; if the soil is clayey, use plenty of well-rotted barn-yard manure, with some lime and salt.

For Winter protection of the half-hardy varieties, and for all varieties in the Northwest, bend down the stems before the ground freezes up, first placing a small mass of earth against the foot of the stems, over which they may be bent without breaking, and then covering them with an inch or two of earth, tan or sawdust. Two stools may be bent toward each other, and covered at one operation.

At a meeting of the New York Farmers' Club, it was the concurrent testimony that the red raspberry is generally indigestible, and hence undesirable for cultivation. Nevertheless, the best fruit growers in every section of the country are highly commending various kinds of red raspberries; and we nowhere

hear of any confirmation of the objection mentioned, and can not but believe that these delicious berries were designed for the use and enjoyment of our race.

SUMMER VARIETIES.

Brinckle's Orange.—Large, prolific, rich orange color, luscious as a peach. It is hardy at Philadelphia, where it originated, and does well in the Northwest with Winter protection. CHARLES DOWNING regards this as the best raspberry of all the many varieties he cultivates.

Clark.—This new red variety has proved perfectly hardy, where tested; fruit large and firm, of a bright scarlet color, flavor the most delicious; a good bearer, and keeps fruiting a very long time. A seedling, raised by E. E. CLARK, of New Haven, Connecticut, probably from the Fastolf, is thought to be the finest of the Antwerp tribe. It has stood the Winter when the cold has reached 25° below zero.

Davidson's Thornless.—One of the black-cap varieties, and the earliest in ripening its fruit—a week earlier than the Doolittle, to which its fruit and habits are similar. It is thornless, and very desirable on that account. It is succeeding well, where tried in the Northwest, even in Minnesota.

Doolittle Black-Cap.—A hardy and fine market berry; has hitherto borne the palm of the black-cap varieties. It does well in the Northwest. Some \$600 worth of the Doolittle have been sold as the product of a single acre in a year. Davidson's Thornless, and the Seneca, bid fair to outstrip it.

Fastolf.—An English red variety, probably a seedling of the Red Antwerp; fruit large, bright purplish-red, rich, high flavored, and productive, ripening in long-continued succession. Too soft for market culture. Needs Winter protection.

Franconia.—A fine red variety, resembling the Fastolf, but of rather more acid flavor, and ripening some ten days later than the Antwerps, producing abundant crops of fine fruit which bears carriage to market well. Needs Winter protection.

French.—A seedling of Fastolf crossed with Yellow Antwerp; large crimson fruit, matures late, and deserves extensive culture.

Garden.—Ripens next in order to Davidson's Thornless; has a dark red or brown berry, as

if red and black were mixed. By some this is highly prized as a garden berry.

Golden-Cap.—If properly trimmed, it will yield heavy crops of large, deep golden-colored fruit—the largest and most productive yellow raspberry grown. From its tempting and attractive appearance it is one of the most desirable sorts for table use, and brings the highest price in the market. The birds, it is said, do not disturb them, probably supposing from their color that they are unripe.

Kirtland.—A very hardy, desirable red sort, resembling the Clark somewhat, but bush not quite so rampant a grower; fruit not as hard, but markets in fine condition.

Knevet's Giant.—An English red variety; it is more hardy than the Red Antwerp, bears a much larger crop; fruit a deep red, and of excellent flavor. It needs Winter protection. The American Pomological Society recommend it for general cultivation.

Mammoth Cluster.—This is different from the Miami Black-cap, CHARLES DOWNING, ANDREW S. FULLER, and many others pronouncing it distinct from and superior to any of the black sort they have ever seen. It is wonderfully productive, the largest in size of the black-cap family; perfectly hardy, having stood the most severe Winters, with the mercury down to 28° below zero, without the least injury; and it comes into bearing just after other black-caps are done. It is cultivated largely by PURDY & HANCE, South Bend, Indiana.

Miami Black-Cap.—This is deservedly a favorite of the Black-cap variety, generally regarded as superior to the Doolittle, but a week or ten days later; fruit very large, brownish-black, and almost entirely covered with bloom; very productive, and perfectly hardy.

Nuomi.—A new variety, hardy, productive, large, of good color and quality, and for firmness the very best for transportation. It is highly commended by the Ohio Horticultural Society, M. B. BATEHAM, and Dr. WARDER.

Philadelphia.—This is one of the best of the American Red varieties; it has proved perfectly hardy and productive in Pennsylvania, Ohio, and northern Indiana; flavor, second rate; color, dull purplish-red; medium size; sends up very few suckers; will bear shipping in quart boxes very well.

Purple Cane.—An old tried, reliable, hardy sort, of the Black-cap variety; fruit almost identical with the Philadelphia, but of better flavor. Profitable for a near market, and for

family use has few superiors. It makes the best of jams. Bushes last many years, and yield best when they become thoroughly rooted.

Red Antwerp.—The true foreign Red Antwerp, of which there are comparatively few in our Western States, is large, regularly long, conical, dull red, with a rich sweet flavor; this is somewhat different from the North River Antwerp, which is of large size, fine flavor, productive, bearing carriage well, and has yielded as high as \$2,800 to \$3,000 per acre. The common Red Antwerp has a small round berry. The Cincinnati Red Antwerp has proved hardy and productive in the Northwest, standing the Winters unharmed, with the thermometer 30° below zero; it suckers prodigiously, and these need hoeing down, as one would weeds among corn; berry is fine for table use and jams, but too soft for market purposes. All the Antwerps do well in partial shade, and succeed in orchards.

Sneeca Black-Cap.—This is a decided improvement upon the Doolittle, producing more and larger fruit, with canes more vigorous. It is very hardy, and succeeds well in the Northwest.

Yellow Antwerp.—Much resembles the Red Antwerp, except in color, and is a handsome and excellent fruit, but is often a long time in maturing. In the Southern States the Antwerp varieties do not succeed.

AUTUMN BEARING VARIETIES.

Catawissa.—Is a native of Columbia county, Pennsylvania, and has a somewhat wild taste, yet the fruit is of good size, roundish form, dark red color, and quality really excellent. It produces abundantly on the young wood, ripening generally during August, September, and October, and until the snow flies. One person, having forty hills, reported gathering from them a quart to a hill per week "from July until October." To secure a full Fall crop experience teaches that the plants should be mowed over level with the surface, early in the Spring, and the new shoots will bear abundantly toward the end of Summer.

Ohio Ever-Bearing.—Discovered near Lake Erie, in Ohio; it is a large, rich, pleasant fruit, of a dark color, approaching the black. Its fruit ripens the last of June, and continues putting out new blossoms and bearing till killed

by the frost, if the weather is moist and favorable. Carries well to market; is cultivated considerably and profitably in New Jersey, and in the Cincinnati region; and both the Catawissa and Ohio Ever-Bearing are commended for cultivation in the Northwest.

Dr. WARDER states, in the Ohio Agricultural Report, for 1865, that the Ohio Ever-Bearing is simply a Fall-bearing variety of the Black-cap; but thinks it is apt to run out if plants are not renewed every third or fourth year. It needs good culture, and is then very productive; he highly esteems it for family use. It is sometimes difficult to propagate these ever-bearing varieties, owing to the tips producing blossoms and fruit instead of striking root.

Dr. WARDER also commends another Autumnal black variety—*Lum's Ever-Bearing*—which resembles the common black, or Doolittle, but is more stocky, and not so tall; a very profuse bearer; fruit large, black, and sweet—the Summer fruiting resembling the Doolittle in size, but is much larger in September and October. Before the first crop of berries is gone, new shoots come up, and thus keep up a succession of fruit till late in the Autumn. Many regard this as the best of the Autumn bearing raspberries. If the plants are all cut down in the Spring, close to the ground—and so of the Catawissa, Ohio Ever-Bearing, and Griggs' Daily-Bearing—they will produce a large Fall crop, commencing to ripen the last of August.

Griggs' Daily-Bearing Raspberry, which has been thought identical with the Ohio Ever-Bearing, upon comparison, presents some points of difference. The Griggs' seems larger, and of rather better quality, and to bear more fully. The canes are also smooth, with scarcely an appearance of spines, while the Ohio Ever-Bearing is pretty well supplied.

Large-Fruited Monthly.—R. L. PARDEE says this is a new variety that he has had bearing in his garden some years, and has often gathered a moderate amount of fruit from it in September and October, as well as in the early Summer. With good cultivation and thorough pruning, it produces full crops of fruit of the character but not equal to the Antwerps. To produce an Autumn crop, prune the canes in the Spring to within a foot of the ground.

In the garden of General J. K. PROUDFIT, at Madison, Wisconsin, a second crop of Fastolf raspberries was produced by whole clusters upon the tops of the tall new canes, among the withered stems of the first crop.

By procuring proper varieties—the earliest, the medium bearing, and the latest—we may have a continued supply of raspberries for four or five months in the year, and in the Southern States much longer. Lovers of fruit throughout our country should strive to encourage the culture of such varieties as will longest extend the fruit-bearing period.

Blackberries.—This fine fruit fills the gap after cherries and strawberries have passed away, and when raspberries and whortleberries are becoming scarce. In most of our States the better varieties are successfully cultivated; and even in the Northwest the Kittatinny, Dorchester, and Missouri Mammoth, hardy kinds, should be thoroughly tested, and if they fail with Winter protection, the best of the native varieties should be substituted, giving them, in accordance with their native habitat, partial shade and moisture by mulching freely, in the orchard or under fences, and, if possible, with a northern aspect. Plant in Spring or Autumn.

Any rich, deep soil, says Dr. WARREN, well plowed, will suit these plants, which should be allowed plenty of room, and may be set every four or five feet, in rows eight or ten feet wide. The ground should be well cultivated or deeply mulched, and the suckers must be removed by cutting them off with the hoe whenever they appear between the rows. Nor should the plants be crowded; one plant every two feet in the rows, or two canes in a hill, will be sufficient, and will yield larger, finer, and better fruit than if more are left together. The blackberry being only another species of the genus *Rubus*, or bramble, the remarks as to the habit and pruning of the raspberry are applicable to this species, and need not be repeated, except to enforce the propriety of Summer pinching, or topping and thinning out, so as to produce strong laterals and stocky plants. This cutting may be done a little higher, say from three to four feet, according to the vigor of the plants, and the habit of the variety.

The most natural manure for the blackberry is a vegetable mold—if a thick coating, the better. A clay soil is unsuited to this berry; too high manuring from the barn-yard does not seem to be favorable, but rather retards its success.

Being ugly things to work among, it is best to train the blackberry to a fence or trellis—on the northern side of a high fence; and for trellises, wooden slats are better than wires. They should be mulched in the Fall with plenty of

vegetable manure, forked in the next Spring. Blackberries are pretty stiff to lay down well, but in the Northwest, if the Kittatinny, Dorchester, and Missouri Mammoth fail to stand the severity of the Winter, then care should be taken to bend the cane over a hill of earth, or bundle of straw or cornstalks, and cover with earth or evergreens.

Varieties.—*Crystal White.*—This is a new Illinois seedling, entirely distinct from the old white blackberry, being free from spines. The canes are bright, clear, light green, vigorous, strong growers; hardy and very productive; fruit large, and when fully ripe, a clear rich white, juicy, tender, sweet, and high flavor. Ripens last of July to middle of August.

Dorchester.—Hardier than the New Rochelle or Lawton, and nearly equal in size; more elongated in form, somewhat sweeter, and producing large crops of high-flavored fruit, sometimes measuring an inch and a quarter in length, of a deep shining black color; they should be fully matured before gathering. Ripen about first of August, and bear carriage well.

Kittatinny.—This new variety, from the Kittatinny, or Blue Mountains of Pennsylvania, has apparently proved the hardiest variety yet cultivated. The Kittatinny, says the Ohio Pomological Report, for 1866, is really a fine plant, very vigorous and productive, and a luscious fruit, superior in its qualities to the New Rochelle. The Northern Illinois Horticultural Society, at its meeting in February, 1868, spoke of it as showing a hardiness and adaptation to the climate beyond any other in culture. It has thus far given more general satisfaction, especially in the colder regions, than any other variety. Fruit, large to very large; a glossy black, sweet, rich, and excellent; is very productive, and continues in bearing four or five weeks.

Missouri Mammoth.—COLMAN'S *Rural World* states that this new variety is much larger than the New Rochelle, or Lawton, and begins ripening earlier than Wilson's Early, and continues fruiting late. The fruit is very black when ripe, of a sweet, vinous flavor, fat pulp, and does not turn red, like the Lawton, by standing after picking. The plant is said to have borne an exposure of twenty-eight to thirty degrees below zero, without the slightest injury; if this be true, it would prove of immense value to the Northwest.

New Rochelle, or Lawton.—More cultivated than all other blackberries. Is of a very vigor-

ous growth, and exceedingly productive; very large and intensely black fruit, juicy, rather soft and tender, with a sweet and excellent flavor. It has proved exceedingly successful and popular in the Middle States and Ohio Valley, but begins to show that it is somewhat tender and unfitted for the Northwest. When gathered too early, it is acid and insipid; when fully ripe, it is too tender to ship to market. Sixty to seventy berries sometimes fill a quart measure; a single stalk or cane produces six hundred to a thousand perfect berries; and in New Jersey, they average eighty bushels to the acre—in some cases a hundred. They ripen about the first of August, and may be continued in bearing, by keeping the ground clear of weeds and cutting away the suckers, for five or six weeks.

Needham's Improved White.—This is a great bearer, the fruit not white but with a blush cheek; not of good quality or size, compared with the Lawton. Some years it fails. Instances have been given of single canes producing eight, ten, and even eleven quarts of fruit.

Thornless Blackberry.—Except an occasional prickly on the under side of the leaf, this bush is perfectly free from thorns; flavor of fruit very sweet, partaking of the Cap raspberry, size medium to small; very productive. Originated in Ohio, and is perfectly hardy, where the Lawton has been killed down to the snow line. It has borne good crops in Illinois. It has the advantage that it can be laid down as easily as the raspberry, which is not the case with the New Rochelle; requires protection.

White Cluster.—It was first discovered in 1856, in Lycoming county, Pennsylvania, growing in a cold, exposed position in that region of the northern extremity of the Alleghany mountains; and in that severe locality it has never been known to winter-kill, and has always produced bountifully of fine fruit, "when fully ripe, much the color of good cream." J. H. FOSTER, of Kirkwood, New Jersey, testifies to its vigorous, hardy, and wonderfully productive habits, where it has been transferred to New Jersey; and says that the plant is quite distinct from other white blackberries, which, as a general thing, have not proved hardy, many being also unproductive, and not a few failing to produce the desired white fruit.

Wilson's Early.—This variety is being extensively introduced in some regions of country; fruit very large, oblong, black; quite firm,

sweet, rich and good, ripening very early, the crop maturing within two weeks, thus rendering it of the highest value as an early market variety. The earliness and uniform ripening of the Wilson, says Dr. WARDER, will cause its rapid introduction into the market gardens.

Mammoth Prolific Dewberry.—

This is a hybrid between the Lawton blackberry and the dewberry, and was taken from Maine to central Illinois four or five years since. It is said to be much hardier than the Lawton, requiring but little, if any, protection in that section of the West. It needs but little cultivation, and will bear fruit from year to year without resetting. The fruit is large, juicy, and slightly acid, but not so sour as the blackberry, and bears shipment well. It is said to be a prolific and perpetual bearer, yielding from sixty to eighty bushels to the acre. J. C. BARTLE, Clement, Clinton county, Illinois, who had cultivated it largely, has shipped the fruit to New York in good condition.

Gooseberries.—This delicious fruit seldom reaches that perfection in our dry, hot climate that is attainable in Great Britain, where the climate is cooler and moister. Gooseberries need a deep, rich soil, shade and moisture—partially shaded on the northern side of a high fence, or planted on ground with a northern aspect, or in orchards, or in alternate rows between grape vines.

The Houghton, or American Seedling (which Dr. SYLVESTER, at a meeting of the Western New York Horticultural Society, regarded as practically identical) is very hardy, prolific and healthy, not subject to mildew; fruit medium size, skin smooth, pale red, flesh tender and good. Downing's Seedling is an improvement upon it, and has given good satisfaction; while the Mountain Seedling has larger fruit than the Houghton, fully as productive, otherwise similar. The Shaker Seedling is a rank grower, prolific and good; and the Ohio Prolific bears wonderfully, and is valuable. "This fruit," say PURDY & HANCE, "is gaining in popularity and importance every year, and we hope may be so improved that we may have as hardy and productive sorts, and as free from mildew as the Houghton Seedling, with the size and flavor of Smith's White," or Woodward's White Smith—a large and excellent English variety, fruit over an inch in size, growing on a small tree, of erect habit.

Dr. WARDER says that notwithstanding the

high price of sugar, which has lessened their use, gooseberries are just as valuable to the farmer's family as ever they were; and the cultivation of the Houghton and American Red varieties is so simple, that they may be, and should be, grown in every household garden, and by the side of every cottage.

It is a mistaken notion that because the gooseberry is often found wild in poor soils, it therefore needs no manure. With the writer, the treatment which ensures the best results is as follows: Give the plants a dressing of manure in the Fall, packing it in and around the roots in Spring. Keep the ground clean and open until about the middle of May or first of June. Then, spread under the branches a layer of straw five or six inches thick, letting it extend over the ground as far as the roots penetrate. This mulching should remain on the ground until the first of September, when it should be removed and the soil worked clean. The design of this midsummer dressing is to prevent any check in the growth of wood or fruit, and to keep the air about the bushes uniformly moist and cool. In this simple way we manage to get good crops, as often as five years out of seven. Persons near the sea-side might use sea-weed or salt hay for a mulch. Tanners' bark is also used with success.

I cultivate gooseberries, says Judge KNAPP, of Wisconsin, in the same manner as I do currants, with this difference; during the dry days and when the fruit is growing, I give them frequent watering over the top, after sunset, with washing suds, cold, and when I can not get that, I apply very weak lye in the same manner. It is well to scatter a spoonful of salt around the bush in the Spring, say about six inches from it. Bushes treated in this manner and well trimmed will not rust. Indeed, the suds or lye will kill the rust after it has formed, and you may calculate on an annual crop of all the berries which the bushes can hold. I often have branches so loaded that the berries will hang in double rows a foot and a half in length.

In the Northwest Houghton's Seedling has thus far succeeded best, though latterly attacked by the borer; it needs Winter protection in that cold climate.

Whortleberries.—The decrease in the crop of wild whortleberries, or huckleberries as commonly called, caused by the cultivation of hitherto waste lands, together with increased consumption, has so enhanced the value of the

article that they latterly sell in the Eastern markets at from \$5 to \$11 per bushel. At such prices they will well repay cultivation; and once set, they would remain permanent. Bushes have been known to yield a quart; but let them be set in rows three feet apart each way and we should have 4,840 bushels to the acre, and these estimated at a pint to the bush would yield over seventy-five bushels to the acre—and a third more bushes to the acre could be safely set, by placing them two feet apart in the row. This would allow the plow to be used between the rows.

Picking them would be much easier than gathering strawberries, and much more pleasant than picking raspberries or blackberries of the common thorny varieties; and, so hardy is the whortleberry, that no trouble about Winter protection would be necessary. Doubtless their cultivation, like the culture of other berries, would greatly increase their size, quality, and productiveness. Mulching may be necessary to give them something like their native condition. In selecting from the wild varieties, reference should be had to their size and vigor, and they should be taken from open, bleak exposures, rather than from the woods or shady nooks.

Mulberry.—Downing's Ever-Bearing mulberry is wonderfully hardy, and worthy of cultivation. The fruit is esteemed for cooking. A wild black variety is a prolific bearer, and the fruit, from June to September, is very profitable for food for hogs. The wild red mulberry is a rapid grower for timber and protective belts, and makes excellent posts.

Currants.—In almost every log-cabin garden, says Dr. WARDER, we used to find this health-giving fruit, which offers its agreeable acid in the heat of Summer as an antidote or preventive of the bilious effects of our torrid season. But now, the currant is a neglected fruit.

This being a Northern plant, it is thankful for a partial shade or protection from the scorching sunshine in latitude 40° or southward. For this object it is well to plant the bushes on the north side of a fence or building, or on ground that is somewhat moist. Currants have been found to do well in the shade of young orchard trees, and they sometimes continue to do well for a long period, even after the apple trees have occupied and shaded the whole surface.

The currant delights in a deep, rich loam, and will thrive even where the soil is somewhat wet. The bushes should not be crowded, as they require about four feet space each way. Trimming may be done in the Fall or Winter, rather than in the Spring, as the buds swell, and the blossoms appear very early in the season. The pruning should consist in shortening two or three of the strongest young shoots, cutting away all the weaker ones, and removing only the oldest and exhausted bearing-wood. Unlike the raspberry, the currant does not fruit upon the young shoots of the previous year's growth, but upon little spurs that appear only on branches that are two or more years old.

The English, and some nice cultivators in this country, advocate training the currant in the tree shape, with a single stem a foot high, and then branched. This plan keeps the fruit well up from the ground, and the effect produced is very pretty; but the natural tendency of this plant is to produce shoots annually from the crown; hence the suckers from the base of the stem are very troublesome, and if neglected, the little tree is soon spoiled and becomes a mere bush.

The currant plantation must be kept clean, and free from grass and weeds. After the cultivation in the Spring, it is a very good plan to cover the soil with a heavy coating of old hay, straw, fodder, leaves, or other suitable mulching material, which will retain the moisture and preserve the fruit a long while in a fine condition. It needs to be well manured, and does the best in the rich alluvium of a brook, spring, or bog, which plainly points to the soil and moisture most natural for its production.

NICHOLAS OHMER, near Dayton, Ohio, planted about three acres of Red and White Dutch currants, which yielded enough to make thirty barrels of wine, and he sold currants enough beside to pay for the sugar used in making the wine, and the wine, which enjoyed an enviable local reputation, sold at a price which rendered his currants a profitable crop.

Gathering Currants.—Currants should also be gathered with their stems; they should also be dry, and all leaves thrown out. Gooseberries, if for shipment, should be gathered dry, and a careful expulsion of all leaves will cause them always to command the best price. Like the strawberries, care should always be taken not to expose them to a hot sun after gathering, for such exposure soon gives them the appearance of being half-cooked.

Currant Cuttings.—Cuttings of currants, gooseberries, etc., made in the Fall, form a callous, and are ready to strike root and grow as soon as Spring opens. When not convenient to plant them in the Fall, the *Agriculturist* advises that they be cut at once, dipped one-third of their length in mud, placed in a cool cellar, and kept moist by an occasional sprinkling of water.

Varieties.—The Versailles was pronounced, at a meeting of the New York Farmers' Club, the best known variety extant; the bunches are extraordinarily large, measuring from three to four inches in length, and the fruit handsome, productive, and of large size. May's Victoria, or Houghton Castle, is very hardy, fruit large, and very long bunches; late, and rather acid, good; plant vigorous; a moderate bearer. The White and Red Dutch are the varieties mostly cultivated; they are large, of good flavor, and productive—the White is the mildest, and very nice for the table. The Cherry is considered by some as identical with the Versailles, but they are evidently different; the latter is as hardy, and decidedly superior to the Cherry in agreeable flavor. The Cherry is the largest of all red currants, quite acid, short clusters, good bearer, and considered the best for jelly. The White Grape is considered the finest white variety, size large, and of a beautiful transparent white; and Fertile d'Angers is very similar to the Versailles—both are French varieties. The Champagne is a pale red or flesh color, and a very acid currant, is commended by Dr. WARDER—good for jelly purposes.

The Black Naples currant, very hardy and productive, deserves to be more generally cultivated than it is. "The black currant," says A. S. FULLER, "is a profitable fruit. It will grow on land too sandy for the red variety, as on Long Island and the pine lands of New Jersey. It is rather slower than the others, and comes in bearing on the third or fourth year, while the red comes into fruit the second year, and produces more. But the price of the black currant is about double that of the common red. For five or six years the culture of the black has been far more prevalent."

The proper way of pruning black currant bushes, of all ages, is to get rid of as much of the old wood as can be replaced with young wood; and to cut but the very top parts from the strongest young shoots, unless it be on purpose to furnish young wood for the next season.

The fruit of the black currant, made into a jelly, is regarded by many, as invaluable as a remedy for sore throat, quinsy, bowel difficulties; and made into jam or dried, it is valuable for puddings and cakes.

Cranberries.—The cultivation of this valuable fruit is steadily on the increase—and yet it is questionable if the increase equals the demand. They are extensively cultivated in Massachusetts, New York, New Jersey, North Carolina, Michigan, and Wisconsin, where the prevailing rock is sandstone, the soil sandy, and the waters soft. It is doubtful if they will succeed to any extent in a pure limestone soil, with hard water. On peaty soils, with a covering of sand, they seem to do well.

The cranberry is naturally a water plant, and so long as there are such large tracts of natural cranberry land, which can be profitably devoted to no more productive purpose, we believe it better that they should retain their own primitive soils. In marshy lands, flowed more or less by fresh water, in a loose soil, they thrive wonderfully; and as they are a fruit always saleable in their season, and largely consumed where they can be obtained, they will continue an object worthy the attention of those who have the proper soil for them.

In 1867, the cranberry crop of New Jersey was forty thousand barrels, and about the same in the following year. In New Jersey, Ocean county alone had more than a thousand acres in cultivation, producing sixteen thousand barrels; and fully a million of dollars are invested in their culture in that single county; while in Monmouth and Burlington counties their culture is on a still more extensive scale. The annual product of the other States named, aside from New Jersey, was in 1868 estimated at fifty thousand barrels; and the value of the whole crop of the country estimated at about \$1,000,000.

The average product per acre is doubtful, as it is founded on different experiences in different localities, with varied conditions, and treatment—from sixty bushels to four hundred bushels per acre; and one writer states that he has heard of a thousand bushels having been picked from an acre. From one to two hundred bushels is about an average yield.

The Bell, the Cherry, and the Egg-shape are the varieties generally cultivated; the Bell cranberry is of two kinds, the large and small. The large Bell cranberry is generally preferred for cultivation; a good bearer and preserves

well; while the Cherry and Egg are nearly as good, if you get large varieties and prolific bearers.

A very common plan of making a bed is to select a bog, or low piece of ground which can be easily overflowed with water, and drained to the depth of two feet, and after turning under the sod, and pulverizing the surface, to cover the whole with white sand to the depth of six inches. The plants are placed about eighteen inches apart. They must be kept clear of weeds, and in the course of three or four years the whole surface will be covered with the vine. By means of a dam the bed is kept under water about one-half the year. The objects of this flowing are three-fold: It destroys worms and insects; it Winters the plants in the best possible manner, and it protects from frosts, which are liable to destroy the crop in Autumn as well as in Spring. The crop may be gathered in the Fall, or, if covered by water during the Winter, in the Spring. After the bed begins to bear, the production of the berry is attended with less care and trouble than any other crop. Unlike other berries, the cranberry can be preserved without difficulty for a long time; the market, too, is seldom overstocked; and it is much sought after for ship supplies, and the foreign demand is steadily increasing.

An old cranberry grower of Massachusetts, gives the following as the result of his experience: "Cranberries will grow on high, moist land, and sometimes produce well, but their proper place is low and springy, or wet land. The best place, however, is a peat bog and swamp muck. Make the surface of your ground as even as possible, and nearly level, with a slight inclination toward a drain, if you have one, in order that it may be easily flowed, and no ponds remain after drawing off the water. This may be done with any material. There should then be put on this level surface, about four inches in thickness of swamp muck or peat, which should be again covered with about three inches in depth of loose sand, free from grass or its fibers, and also from clay or stones. It is not important what the color or quality of the sand, if it be not adhesive, and is free from roots and grass."

F. M. TODD, of Bricksburg, New Jersey, thus states his views on the culture of the cranberry:

1. A peaty soil is needed. It may be either a clear peat bottom, or it may be a mixture of peat and sand—what we call savannah ground. Old cedar swamp bottoms seem most natural to the cranberry.

2. The plantation must be situated on a running stream of water, with dam and gates. Here in New Jersey, we consider it necessary to keep the vines covered with water the entire Winter. This would probably be unnecessary in North Carolina; still it would be well to be able to do so, as it is the only way of exterminating insects and worms. If your bottom is peat, it must first be cleared of bushes and tussocks, and then sanded to the depth of five or six inches. If savannah, it must be plowed and harrowed. The ground may be prepared at any time, but Spring is the best season for planting. In sanding peat bottoms, wheelbarrows may be used, or a car made expressly for the purpose, running on a wooden track, ironed with old wagon-tire, and pushed along by three or four men. The ground must be marked out as for corn, with a sled, two feet or eighteen inches each way. Have a sharp stick, with a knot or crook in it; place your foot on the knot and push it down; then set out two or three vines in the hole, taking care they reach through the sand* into the peat, and packing the sand close about them. It is not necessary for the vines to have roots; they are very tenacious of life, and will grow if run through a cutting-box and sown broadcast.

3. *Cultivation.*—The first and second Summers, hoe and keep free from weeds; after that the vines will take care of themselves.

4. *Harvesting.*—We employ women and children to pick them in good picking, for fifty cents a bushel.

5. *Putting up for Market.*—Put them up in barrels, or in bushel crates made expressly for the purpose. They will bring a better price if sorted over. There are various contrivances for picking them over, but none of them are very satisfactory. A first rate article now brings about four dollars per bushel. Some years prices are much higher, and never less than three dollars for a prime article.

The berries borne the first and second seasons have generally been sufficient with me to pay for hoeing and weeding. The third season a fair crop may be expected, and ever afterward the plantation grows more productive, and your only trouble or expense is the picking and putting up for market.

Upland Culture.—Though the natural habitat of the cranberry is the lowland, yet they can be raised on poor uplands, with a surface of five or six inches of sand carted on—or in such localities as the pine barrens of Long Island,

or the pine lands of New Jersey. They need to be set in wider rows than those in swamps or bogs, so as to afford frequent plowing to prevent the ground from baking, and impart moisture to the plants. Of course, by this system of culture there is no opportunity for flooding. "One reason usually assigned for flooding," says THOMAS E. BRIDGER, of Long Island, "is the supposed necessity of destroying the cranberry worm. None trouble us as yet. Another reason is to keep them back, out of the way of late frosts—an unnecessary precaution here, as they do not blossom until June. Another reason is given, that much moisture is necessary during their growth, to raise the berry to perfection. To this I answer, cultivation provides the remedy. The ground being naturally underdrained, if the surface is kept mellow, any drouth can be successfully resisted. At night we usually have heavy dews, which help materially; and by trailing the vines in rows, a natural mat or covering, operating as a mulch, is provided, thus helping to assist the natural habit of the plant, while it gradually accommodates itself to existing circumstances."

The product of the upland culture must necessarily be less than that on the lowlands; one cultivator in Massachusetts, from half an acre of upland, gathered the third year thirty barrels of berries, which he sold at fifteen dollars a barrel; the cost of picking and marketing was three dollars a barrel, leaving a clear profit of three hundred and sixty dollars.

Professor FOREST SHEPHERD, of the Western Reserve College, Ohio, found several years ago a native upland cranberry in various sections of British America, particularly on the Neepegon coast of Lake Superior. "The plant," says Professor SHEPHERD, "is much like our common cranberry, but more vigorous, covering the ground entirely with a green mat, while the surface is flaming red with berries, more delicious than anything of the kind I have ever tasted. I have no doubt the plants may be propagated to great advantage on poor, cold, sterile lands of a northern exposure in all the United States. But they should not be put in marsh or bogs." The fruit of this variety resembles an ordinary pea in size and shape, of a beautiful pale red color, bright and glossy; softer than the swamp berry, and therefore will not keep so long; flavor remarkably pleasant and agreeable, peculiarly adapted for jellies and preserves.

FOES OF THE FARM:

INJURIOUS INSECTS AND DISEASES; REMEDIES AND METHODS OF DEFENSE.

THE different kinds of insects found within our country number about thirty thousand, or about ten distinct varieties to one of the animal kingdom; and of this large number not less than one-third are cannibals, devouring one another for food—thus the bald hornets and spiders catch flies, the mud wasp catches the spider, the ichneumon fly catches the wasp, and birds and other insect-feeders catch the ichneumon fly. The *American Entomologist*, edited with great ability by Dr. B. D. WALSH, of Rock Island, Illinois, estimates the average yearly depredations of noxious insects in our country, at three hundred millions of dollars.

It is the first duty of the farmer to clean out all the fence corners and rubbish heaps, and burn them, thus destroying the germ of many insects that would otherwise prey upon the crops and the orchard. He should learn from books, agricultural papers, and his own observation, when to expect their appearance, and be prepared, with the best means at command, to avert their increase and depredations.

Toads, frogs, and skunks are really friends of the human race, destroying a multitude of worms and insects, and their larvæ—frogs along low grounds and streams, and skunks and toads especially in the field and garden. Even snakes, lizards, and spiders subsist upon insects. Birds, too, render the farmer a vast service in the destruction of insects, and though they do eat a few berries and other fruits, yet they should be protected and encouraged. Not one bird in fifty fails to serve as the ally of man against his enemies. The shrike, or butcher-bird, kills mice, and wages a most relentless war on locusts, grasshoppers, moths, and other insects, not only for food but for amusement—often impaling hundreds of them on the thorns of the hawthorn or wild plum, near his haunts. He is rightly named, a butcher-bird.

An Alabama planter raised bountiful crops,

while the caterpillar destroyed the cotton of all his neighbors around him. The reason was simply this: He issued the sternest orders that not a single bird, except the jay, should be killed upon his plantation under any pretext whatever. He allowed little willow groves to grow in his fields, and to them he sent a sack of oats every morning, which were scattered upon the ground. The birds fed upon the oats, and swarmed in thousands around his fields. They exterminated the cotton-fly; and hence there were no eggs, there were no caterpillars, there were no larvæ, but there was a blooming garden in the midst of a blighted wilderness.

Some of our States have wisely passed laws making it a penal offence to destroy brown thrushes, blue birds, martins, swallows, wrens, cat-birds, meadow-larks, or any other of the insect-eating birds. It has been estimated that the swallow alone destroys at least nine hundred insects per day.

Enemies of Fruit and Trees.—We find it convenient to divide this chapter, postponing a consideration of the enemies of garden and field crops, and first paying attention to such as injure fruit:

Caustic Soda for Fruit Trees.—The late Professor MAPES gave an account, at a meeting of the New York Farmers' Club, of a series of experiments which showed that a saturated solution of caustic soda is not injurious to the most tender living vegetable, while it dissolves all dead vegetable matter. For several years he made extensive use of this strong solution for fruit trees, and always with the best effects.

It destroyed great numbers of insects, and kept the bark clean and bright. A pound to a gallon of water makes a proper saturated solution.

Calomel for Fruit Trees.—An apple tree, which was in process of destruction by insects, and

rendered unproductive, was thoroughly cured in this way: A hole was bored in the body of the tree, nearly through the sap, and two grains of calomel inserted. As soon as it was taken and distributed by the sap, the vermin died, and the tree began to bear fruit, and has done so for three years, to the entire satisfaction of the owner. Sulphur may be mixed with the calomel and produce good results.

Beneficial Effects of Salt.—We believe, says Wm. C. LODGE, of Delaware, in the United States Agricultural Report for 1865, that we have discovered a sovereign remedy for nearly all diseases of our fruit trees, as well as for the destructive insects, which so frequently destroy our fruit after it has given promise of satisfactory crops. It is nothing more than common salt. We have experimented with it on bushes and young trees, with admirable effect in many instances, though sometimes with injury, owing rather to the manner of application than the agent employed. Its application was first suggested to us as an insect-destroyer, from the success of an experiment made upon the tree-moth. We found it altogether effectual in preventing injury from this troublesome pest, and so we extended our experiments, with almost equal success, to the fruit-destroying family of pests. The difficulty is in the proper application of the remedy or preventive, as salt is so injurious to tender vegetation that, frequently, we can not reach the insect without also touching a bud, blossom, or tender leaf. Where the atmosphere is impregnated with saline particles, nearly all our troublesome insects, and most of our diseases of fruit trees are unknown. The most perfect fruit of the peach, plum, nectarine, and apricot, and the most enduring trees are found in the neighborhood of salt water. On the higher lands, along the Delaware and Chesapeake bays, all stone fruit trees bear plentiful crops, and endure much longer than in the interior. On the islands of the bays where the shores are washed by salt water, we have found peach and plum trees with their loads of fruit in such perfect condition as we have never seen elsewhere. Of the many plum trees we have examined in those localities, we have yet seen no trace of Black Knot, nor any sign of the Curculio on the fruit. Peach trees flourish and bear annual crops at the age of fifty, and in some cases seventy years, and on the islands of the Chesapeake the figs produce two or three successive crops of perfect fruit in the same season.

I have long held, says HORACE GREELEY,

that every enemy of fruit that burrows in the ground may be successfully pursued, and easily exterminated, by the proper use of salt. Fall plowing is also a good remedy, if the ground be left in ridges. Freezing kills the eggs.

Other Remedies and Suggestions.—Bind a bundle of the boughs or twigs of the red cedar around the body of each tree infested with worms, with the butts uppermost, and the worms will speedily disappear.

Make a strong decoction from coarse waste tobacco, and to every five gallons add one pound of copperas, and apply it with a brush to the trees.

The dregs, after soap making, proves an effectual remedy against fruit-tree insects. Pour the fluid where the tree divides into limbs, that it may run down the bark to the roots, where eggs of insects are often deposited.

The ammoniacal water of gas, or gas liquor, mixed with three-fourths its quantity of common water, and sprinkled over the leaves and branches of trees, will destroy all insects upon them. A small trench should be dug around each tree to receive the water which falls, that it may soak down to the roots of the trees and destroy insects which may harbor about the roots.

As a wash for the bodies of young fruit trees, take lye made of ashes or potash—one pound of potash will be enough for a gallon of water; or common soft soap mixed with water until it is of the consistency of cream. It may be applied with brush or swab, in July, when it will have a tendency to destroy the eggs of insects which are then deposited on the bark, and about the roots. This wash will also be found effectual in removing moss and other parasitical productions. A sufficient amount of potash is contained in the soap to accomplish these ends, and yet not enough to injure the bark of the tree, and as it is of vegetable origin, it is more congenial to the tree than lime, and is always to be preferred. It does not close the pores of the bark as lime wash, or coal tar, or grease does, but leaves them unobstructed and open to atmospheric influences, and in a state of vigorous and perfect health. It has long been used by orchardists and gardeners, and has never been known to injure any fruit tree, when made and applied as above directed.

Apple Diseases and Insects.—We can but briefly mention the more common diseases of the apple, and its insect enemies, suggesting remedies when known.

Apple Beetle.—This little insect is found burrowing in the pith of the young branches of the apple tree in the Spring. The branches above the seat of attack soon die. Cut off these branches, below the dead and dying portions, and burn them.

Apple Blight.—Destroys the terminal shoots all over the tree, as stated by Dr. J. H. SALISBURY and C. B. SALISBURY, in the Ohio Agricultural Report for 1863, by a fungus disease—generally making its appearance suddenly after warm, moist weather; and more reliance should be placed on preventives than curatives—among the former, are sulphur and sulphuric acid, which serve as fertilizers to the tree. Others represent the blight as caused by a small worm no larger than a needle. Cut off the diseased limbs and burn them.

Apple Borer.—This insect, of the beetle family, lays its eggs and deposits them, in June or early in July, in the tender bark at the base of the tree—laying one egg in a place, and sometimes eight or ten in a tree—producing a grub about an inch long. Make a wash of a pailful of soft soap, four quarts of sulphur, four quarts of air-slaked lime, four quarts of wood ashes, half a bushel of cow or hen manure, with water enough with these ingredients to fill a barrel, and use it freely on the trees and about their base. Some fill the holes with hard soap, or a piece of camphor, behind which a soft plug is driven; or probe the cavity with a flexible wire; while others still, with a gouge or pruning knife and mallet, thoroughly dig out the borer—where but a few are taken out the tree soon recovers, heals over, and does well. The waste water from salt works, called “mother water” or “bitter water,” applied, about a pint at a time, at various intervals from June to August, about the base of each tree, or, in lieu thereof, a strong briny decoction, is regarded as a simple and effective remedy. Dr. ASA FITCH recommends cutting an orifice some three inches above the aperture where the borer enters, at the upper end of the burrow, and pouring in hot water from a tea-pot spout and scalding the depredator. But preventives should be resorted to, as the easier and safer way of saving the trees, and promoting their health and productiveness.

The late Mr. DOWNING recommended a mixture of soap, sulphur, and tobacco water, or soap and tobacco water, mixed to the consistency of thick cream, with which to wash or paint the bark of the tree immediately above the ground and axils of the lower limbs.

Others destroy all the borers they can find, then bank up the earth around the trunk to the height of several inches, and then tie on paper so as to cover the trunk to the height of about ten inches above the earth, to prevent the females from depositing their eggs. If this paper is smeared with gas tar, all the better. Others recommend placing a piece of hard soap in a little bag, securely in the crotch of a tree, so that it can drip down the trunk with the rain, thus constantly supplying the tree with alkali and grease—no borer will go there. Solid whale-oil soap, rubbed around the base of the trees, is also an effectual remedy.

Apple Maggot Fly.—A very small two-winged fly proceeding from the larvæ or grubs found in fruit previously perforated by the codling or apple moth. This fly injures or destroys the pulpy substance of apples. It prevails in the Eastern and Middle States.

Apple Midge.—A slender, tapering, glossy, white worm, which finds its way into the interior of ripened or stored apples. Preventives, as in the case of the apple worm or codling moth, are the only modes of circumventing these pests.

Apple-Root Plant Louse.—This insect, says Dr. WALSH, lives habitually underground, sucking the sap from the roots, and causing thereon large excrescences or swellings. In Illinois it is erroneously called the Woolly Aphis or Plant Louse, and destroys many trees, by sucking up the sap of the roots, producing much the appearance of dry rot. Remedy—drench the roots of infested trees with boiling water, which will not produce injury to the tree; a strong decoction of soap or lye, or brine, will generally prove effectual. Before young apple trees are planted, the roots should be soaked a considerable time, either in a strong solution of soap, or in strong tobacco water—the latter probably the best—and thus destroying whatever lice may exist on the roots of the young trees.

Apple Thrips.—Minute, slender insects, which wound the young apple, and are difficult to exterminate. Dusting the vegetation which they infest with flour of sulphur, and washing it off a few days afterward, has been found successful in some cases; and would, doubtless, prove more so if applied when the thrip is in its larvæ, or immature state.

Apple Worm or Codling Moth.—This insect disfigures many of our apples and pears, causing them to fall prematurely from the tree. The moth has four wings, light-gray and

brown, and a dark brown oval spot on the hinder margin. It deposits its eggs in the eye or blossom end of the fruit, and these hatch in a few days, producing a reddish-white grub, which eats its way to the core, when the apple shortly falls to the ground. The worm now seeks shelter in the crevices and beneath the rough bark of the tree, spins a web-like cocoon, and remains until the next season. One remedy is, to keep the bodies of the trees well scraped, and annually washed with lye water early in the Spring, and picking up all the fruit as fast as it falls, or letting hogs run in the orchard to eat it.

It has long been known that by placing an old cloth, or anything of that nature, in the crotch of an apple tree, the apple worms may be decoyed into building their cocoons underneath it, and thus be destroyed wholesale. Dr. TRIMBLE's method—which amounts to the same thing, and has been found to be practically very beneficial—is to fasten two or three turns of a hay band round the trunk of the apple tree, and every few days, from June to the middle of September, to slip the hay band up and destroy the cocoons that have from time to time been formed on the bark underneath it. Every female moth that hatches out in July or August, from the first brood of apple worms, will probably deposit an egg in some two or three hundred nearly matured apples, thereby rendering them more or less unsaleable and unfit for use.

Tansy or wormwood growing near apple trees will, it is said, destroy or drive away the moth. Fires built around the orchard in the evenings of the latter part of June and early in July, will attract and destroy the moths in large numbers, and will greatly tend to keep them in subjection.

Army Worm.—These pests have occasionally appeared in different parts of our country during the past century. As a general thing, they commence on one side of an orchard, taking all the trees as they proceed, completely defoliating them. Prepare strips of birch or basswood bark, three or four inches wide—or anything else that will answer the same purpose—tie it about half-way up the trunk of the tree, and smear with a coating of tar. This will effectually stop their progress.

Bark Lice.—Lice seldom do any harm on a thrifty tree, but on poor trees, as on poor calves, they delight to make a lodgement. They are very minute insects, with a shell or scale, and the inexperienced would scarcely dis-

cern them. Remedy—induce vigorous growth in the tree; a crop of buckwheat in the orchard, maturing and decaying there, forms a mulch, and the trees thrive, and the lice disappear. Ashes applied about the base of lousy trees render a good service in this direction; the lye passing through the roots into the tree, doubtless furnish the lice a distasteful food, and they either travel to other quarters or perish. A wash applied to the tree, of strong lye and flour of sulphur, in May or June, and a repetition, will do no harm. A coat of lard, put on with an old shoe brush, well rubbed in, will destroy the lice in two or three days; and a thorough application of kerosine oil with a paint brush, will not only thoroughly clean the tree of lice, but of dead bark and moss, and give new vigor to the tree. Hornets and yellow jackets have been known to exterminate bark lice, eating them up, old and young. Dr. WALSH, the State Entomologist of Illinois, declares that the usual wash remedies amount to little or nothing, except so far as the friction used with a stiff brush, and that soon after the blossoming of the apple, serves to destroy the vermin.

Canker Worm.—There are several allied species of this insect, not alone confined to the apple, but preferring the elm to all other trees. The male is a moth, with pale, ash-colored wings, with a black dot, a little more than an inch across; the female is nearly wingless, oval, dark ash-colored above, and gray beneath—a measuring worm, ten-footed, and nearly an inch long. Early in the Spring the worm rises out of the ground; the females, having no wings, climb slowly up the trunks of the trees, looping or arching up their backs at every step, while the winged males hover about to pair with them. The female soon lays from sixty to a hundred eggs, glued over, closely arranged in rows, in the forks of the branches, and among the young twigs, which are hatched out the latter part of May, and the dusky-brown or ash-colored canker worm, with a yellow stripe, soon commences preying upon the foliage. A belt of canvas, saturated with tar and train oil, encircling the tree, prevents their ascent. Another preventive is a leaden trough, encircling the body, secured in its place and filled with oil.

Another remedy is, spading up the ground in the Autumn, beneath the trees, on which they appear, and dressing it liberally with lime; or using bands of straw and cotton batting tied around the tree, and examined daily to kill all

that have become entangled in it. Tarring is effective, if it is thoroughly done. A better composition, however, is rosin and oil, mixed to such a consistency as to soften a little when the weather is sufficiently warm to cause the moths to move. It is thus always ready to catch them. When the temperature is cool enough to harden the composition it is too cool for the insects to run, and when it is warm enough for them to run, it softens the composition, and they can not get over it.

Still another remedy: Adjust a pan upon a long pole, in which brimstone and live coals are placed; the worms coming within reach of this fumigation, are destroyed. Others with a long pole jar the limbs of the trees, shaking off the moths, which is best effected when no dew is on, and the tar belt around the tree prevents their re-ascension.

Caterpillar.—The common orchard caterpillar is very destructive of the foliage of apple trees. It is hatched in the Spring as soon as the leaf buds begin to open. From the tenth of an inch long, and no larger than a cambric needle, they increase in size until they are two inches long, and a quarter of an inch in diameter. In the latter part of Summer, having spun a cocoon, and passing to the pupa state, it comes out a yellowish brown miller, lays its eggs, and dies—these eggs, deposited in cylinders or rings, numbering from three to five hundred each, are protected from the weather by a vesicular water-proof varnish, and hatch in the Spring.

For their destruction, some cut off the small branches which hold the eggs during Autumn or Winter, and burn them; and those that are overlooked may be destroyed in May or June by attaching a sponge or round brush to a pole, and saturating the sponge with spirits of ammonia, and turn it around among their nests. Others remove with the hand the nest and its inmates at early morning, crushing the caterpillars beneath the feet. Pick off every individual, and clean off the nests; and, in early Spring, scrape off the loose bark and moss, and burn it, and it will be found that the apple-tree caterpillar can easily be suppressed. Another mode: Take a pan with lighted charcoal, and place it under the branches of the tree or bush. Throw a little brimstone on the coal; the vapor arising will be mortal to these insects, and destroy all on the tree. Still another remedy practiced with success is, to attach a swab, made of fine rags or tow, to a light pole, and kept saturated with thin tar. Early in the

morning, when the caterpillars are in their nests, rub out the nests with the swab, giving the upper sides of the branches on which the nests are a light touch with the swab. Any caterpillars that are not at once destroyed will be stuck in the tar and die. Going through an orchard in this way two or three times is sufficient to rid it of these troublesome pests.

New York Weevil, or Curculio.—This insect attacks the apple tree most in the night, and in still, cloudy weather in May and June, gnawing the buds and young shoots so that they break off and die. The same remedies are resorted to as in the case of the curculio, or plum weevil, which see.

Palmer Worm.—A wanderer, as the name signifies, a small worm, about half an inch long, with sixteen legs, and extremely nimble. Palmer worms give the trees the same denuded appearance as the canker worm does, and the same remedies should be applied to prevent their depredations. They subsist on the apple, oak, cherry, plum, and other trees.

Rabbits and Mice Gnawing Fruit Trees.—Some recommend rubbing the trees with fresh pluck or other offensive offal of slaughtered animals, or with fat smoked bacon, while others stoutly contend against trusting to fresh blood or any sort of greasy applications. A few dozen grains of strychnine, nicely put into small bits of carrot or turnip—only a half a pin-head grain of the poison to each piece—and dropped into the principal run-ways, will soon dispose of the long-eared tribe thereabouts; and, for rats or mice, insert the poison in small bits of tallow. Or, wind the body of the tree with hay or straw rope; or, split cornstalks, about two feet long, and place them, pith side next the tree, all around, and fasten them with a small cord an inch or two from each end. Another suggests leaving several shocks of corn convenient for rabbits and mice, in or around the margin of the orchard, affording preferable food for their purpose; while others dose them well on red-oak bark, or powder and shot. Or, remove all stubble and grass from around the tree, and bank up with fresh earth; and, during the Winter, tramp down the snow solidly around the tree; or, wrap a piece of heavy coal-tar paper about the trunk, placed close down to the ground, extending up a foot or more. A whitewash, made thick with lime, and thinned with a strong decoction of tobacco water, put upon the lower portion of the tree, will prove effectual.

The Rascal Leaf Crumpler.—This small moth

has been discovered and described by Dr. WALSH, and is believed to be, for the present, exclusively a Northwestern species, sewing together, with silken threads, the terminal leaves of young twigs, inside of which it feeds at leisure. In some localities in Iowa, the crumpler has so defoliated apple trees as to destroy the crop; but where it does not appear in extraordinary numbers, as it generally does not, its destruction of a few leaves probably operates as a Summer pruning, thereby checking the exuberant growth of wood, and confining the growth to the fruit. The nest of the crumplers may easily be crushed between the fingers, and the little crumplers, or caterpillars, destroyed. It not only infests the apple, but the crab and plum trees.

Woolly Aphis.—Appears in the crotches and crevices of branches in the form of minute white down, and is easily destroyed by washing the tree with lye water, lime wash, or whale-oil soap; if around the roots, pour plentifully of hot water at the base of the tree.

A good insect wash is made of five gallons of weak lye, one pound of powdered sulphur, and four ounces of soot or lamp-black, thoroughly mixed, and applied with a brush.

The Cherry has its enemies, which we must briefly notice. The *Cherry Plant-Louse* constantly infests the cherry tree, completely colonizing many of the young leaves. Dr. FITCH estimates that at least twelve millions of these insects have found a lodgment on a single tree of about ten feet in height. Numerous as they are, they soon fall a prey to their insect-eating enemies, and none are left by the close of June, except a few which appear but effect little harm. The remedies applicable to the apple plant-louse are equally applicable in this case. Besides the louse, the caterpillar and curculio are pests which infest the cherry, and require the same remedies as in the case of the apple and plum tree. Bursting of the bark, and exudation of gum, is a somewhat frequent occurrence—probably caused by lack of proper drainage of the soil where planted, and by severing large limbs from the tree.

Current Worm.—The remedy most recommended is to scatter from an ordinary pepper or dredging-box, plentifully over the bushes, from time to time, pulverized white hellebore, which can be obtained of any drug-

gist at a low price. Or, take two pounds of sulphate of iron (copperas); dissolve it in two gallons of hot water, and then dilute with ten or twelve gallons of cold water, and sprinkle the bushes with a watering pot, in the morning, when the dew is on the bushes; or take fine dry road dust, or common soot sprinkled upon the bushes; or use tobacco-smoke fumigation; or one part of common soft-soap well dissolved in ten parts of water, applied to the bushes with a watering pot early in the morning. The application of a sprinkling of dry soot around the roots of bushes, when early digging operations are being proceeded with in Spring, will act most successfully in preventing their appearance; and this, resorted to in successive seasons, will entirely extirpate the pests. Another remedy is, a thorough mulching of coal ashes under the bushes, early in the Spring, or late in the Fall, so when the worm emerges from the ground to change into a fly, it can not pass through this coarse gritty coating, and perishes there.

The *Current Borer* is not apt to infest bushes where the three-year-old wood is regularly cut away, thereby imparting vigor to the remainder of the bush. The insect is produced from a blue-back moth, depositing its eggs in June near the lower buds; these hatch, and the young borer enters the stem to the pith, upon which it feeds. Cut off and burn all the branches affected.

It is recommended to plant black currant bushes among red and white currants, as the odor of the black currant seems distasteful to the borer, and drives him off.

Gooseberry Midge.—This insect punctures the fruit, and deposits its eggs in it, producing one or more small bright yellow maggots—the fruit turning red and putrid, falls prematurely to the ground. All such fruit should be gathered and thrown into the fire to destroy the worms they contain. The currant worm sometimes preys upon the leaves of the gooseberry, and the same remedies, hellebore, etc., should be applied.

Mildew, so common to the gooseberry, is regarded as a parasitical plant or fungus, attaching itself to and enveloping the fruit; induced by heat and want of moisture in the atmosphere and free circulation of air. Mulching the ground three or four inches deep serves to keep the roots cool and moist, and give vigor to the bushes. Freely sprinkling the bushes once or twice a week with strong soap-suds, and the use

of salt, are regarded as good preventives of mildew.

Grape Insects and Diseases.—

The *red spider* is a very small dark red insect, scarcely perceptible to the naked eye, locating itself on the under side of the leaves, feeding upon, poisoning, and injuring the plant. It may be destroyed by syringing and damp air, or by exposing sulphur occasionally to a high temperature without actual ignition. *Scaly and mealy bugs* may be destroyed by using a wash made as follows, and put on with a painter's soft brush: Whale-oil soap and tobacco, each four ounces; nux vomica, one ounce; sulphur, four pounds; over which pour three gallons of boiling water, and stir all until thoroughly mixed—keeping it away from animals, as the nux vomica is a deadly poison. *Aphide*, or green and black fly, a small, sluggish insect; *thrips*, or *grape-vine hoppers*, small, active, linear-shaped insects; and *fretters*, which move by jumps when disturbed, may be destroyed by tobacco fumigation, avoiding a too severe application while the leaves are young and tender, lest they should be injured. Plaster has been successfully used in repelling the thrips on the grape. The depredations of the *blue beetle* on the grape vine have been effectually prevented by applying a mixture of molasses, hellebore, and sulphur, in about equal parts, added to a strong decoction of tobacco, so as to be about as thick as paint. Put it on with a pencil brush, to the tip of each bud, just before opening. A small quantity, say one gill, is sufficient for several vines, and the labor of applying not so great as that required for pruning.

The *rose bug*, a lightish-brown little beetle, is in some sections quite destructive to hardy grape vines, before and about the time of blossoming. Hand-picking is the most effectual mode of checking its ravages. Dr. WALSH describes the *grape curculio*, a small, round-snout beetle, which punctures the grape, and causes it to fall; and says that it can be caught and destroyed by placing a sheet under the vine, or something like an inverted umbrella, lined with white cloth, and that the least touch will bring the curculio off the vine. The *grape-leaf gall-louse* is peculiar to the frost grape varieties, and to a few of the cultivated kinds—the Clinton, Delaware, and Taylor; perhaps the wash described in this paragraph might prove a good remedy.

The *grape-root borer* resembles the common peach borer, but lives exclusively under ground,

deposits her eggs on the collar of the vine close to the earth, and the young immediately descend to the roots, and depredate on the bark and sap wood of the roots, gouging and furrowing them so badly as often to destroy the vine. The Scuppernong grape is entirely exempt from the borer; and should this pest become too troublesome, the difficulty may be obviated by grafting our best varieties on Scuppernong stock.

The *blue caterpillar* is quite a common depredator in some sections, eating the leaves; hand-picking is, perhaps, the only effectual way of destroying them, though dusting the vines, when bedewed, with lime or wood ashes, or syringing them with a strong solution of potash and tobacco, has been recommended. A single white worm will sometimes be found, on close inspection, on the extreme tops of grape vines, inclosed in a web which binds together one or two leaves; and another worm, from a quarter to half an inch long, is still more destructive, lying right in the cluster, and eating the blossom buds, and being of the same color as the stem, close examination is necessary to discover it; both kinds should be sought for and destroyed.

The diseases to which the grape is subject, are neither very numerous nor destructive. Overbearing doubtless destroys more vines than all other causes combined; and where vines are overloaded, as the Concord often are, the result frequently is that but a small portion of the fruit ripens. Too poor or too rich soils are often injurious; and an overdosing of soap-suds, or a stagnant moisture around the roots, tend to injury. "I have reason to think," says Dr. HOBBS, "that much disease is incited by overmanuring; for, reasoning from analogy, overfeeding should be as bad for vegetable as it is for animal life, and equally productive of disease, as is underfeeding. The only vines which I know that require a little good feeding are the Rebecca, Allen's Hybrid, and the Delaware. Again, disease has seemed to me to occur from overcrowding. The heavy-foliaged vine should be grown where the air can blow well through it; the laterals in such vines should be kept well pinched off. A mass of foliage which neither wind nor sun can penetrate is sure to become diseased. The fruit, too, I have seen become diseased from neglect at the right time to pinch off the laterals, letting them run until they were a foot or so long, and then stripping them off in a sudden and wholesale manner. After such treatment the grapes sometimes rot, at

other times fall off singly or in bunches. These are diseases of debility, and time and care, the proper strengthening of the vine is all that is necessary to remove and prevent them."

The *black rot* is a great scourge to the grape in the Western States, often engendered in wet seasons from an excess of moisture, or in regions where the dews are heavy. Dusting the bunches with sulphur on the first appearance of the disease, while wet with dew or rain, will generally stop its further progress—apparently producing volatilization, or sulphur gas; and hence, if strewn upon the ground, the soil should not be hoed or stirred for several days thereafter. For proper sprinkling of the vines, about eight pounds of pulverized sulphur are required per acre. "Probably," says FULLER, "the best method to pursue, is to choose those varieties that are least liable to be effected, and plant them upon well-drained soils;" and Dr. WARDER suggests that as the Concord, Hartford, Ives, Lyman, and some others, have produced a healthy foliage, in those terribly trying seasons when most of our more delicate sorts have been destroyed, these hardier varieties are the hope of the country.

A remedy for the prevention of the "rot," where vines are already planted in deep-trenched, highly manured, tenacious, and retentive soils, has been proposed, and appears to be philosophical and highly promising. It is that of Dr. SCHROEDER, the enthusiastic vineyardist, of Bloomington, Illinois. He remarks as is generally observed, that the first crop of Catawbas is not injured by the rot, and therefore proposes that the vineyard shall be frequently renewed by layering, after each new vine thus formed shall have borne its first large crop, or the third or fourth year after planting. Long canes should be grown for layering and laid on the soil, extending to midway between the rows. By continuing this process successively from each new vine for four years, and extending the layers properly, the last plant may be brought in position to take the place of the original parent, and a vineyard of young vines be constantly maintained, which, it is claimed, are always vigorous, free from disease, and produce superior fruit.

This method, which appears well worthy of trial, certainly does away with the evil of extraordinary root extension and unnatural diminution of leaves (or the evaporating organs) by excessive pruning. We know that in the vine, as in other plants, the growth of the root

and its branches keep pace with the extension of the stem. As the latter shoots upward and expands its leaves, the former grow outward, absorbing moisture to supply the evaporation into the air. The older the vines the greater must the root expansion have become, and the more numerous the rootlets occupied in absorption; but the annual pruning at one fell stroke destroys the equilibrium which nature had endeavored to establish, and the leaves and fruit of the aged pruned vine are rendered liable to engorgement and suffocation with excess of moisture or of sap.

Mildew is a very minute fungus, or parasitic plant, attaching itself to the weakest of the plants or young vines, and feeding upon them; and the best preventive is, in good treatment, strong plants of healthy varieties, planted upon a warm soil, allowing no greater number of shoots and leaves than can be fully developed, with a free circulation of air. MARSHALL P. WILDER states that he has successfully used sulphur on his grapes for mildew, and in no instance failed to effect a speedy cure! Both in this country and in Europe, sulphur for both the rot and mildew is more used than all other remedies combined.

Every person who has trained vines on his out-houses has noticed, in seasons when they have suffered from mildew, that the branches which were sheltered by a projecting coping or eave were almost invariably free from injury; and that the grapes were ripened under this shelter, while shrivelled or decayed on the rest of the vine. A hundred and fifty years ago, sheltering grapes to protect them from mildew was practiced in England, by a succession of short projecting tiles from a wall, or boards from a trellis, one above the other, a foot or more apart, with openings between them for the arms and stronger branches of the vines to pass upward; while under each of these short boards the shorter branches and fruit would be protected from the "perpendicular frosts," or, as we would now express it, from direct radiation toward an unclouded sky, and through an atmosphere deprived of its heat-absorbing and sheltering vapor. Mr. SAUNDERS, of the Governmental Garden at Washington, has recommended a protecting grape trellis—a revival of the ancient English method—saying: "I have nearly one hundred varieties of grapes under the shelter trellis, and none so sheltered showed any signs of mildew, although we lost very heavily on those not protected."

T. K. PHENIX, of Illinois, stated in the

Prairie Farmer of December 24, 1864: "It is a fact worthy of note, that those vines under our covered trellis never had a mildewed leaf, and had ripened their wood hard and fine, while exposed vines all went. So much in favor of protection, and such simple protection too!" A Concord near an apple tree that had been permitted to spread itself in the top without let or hindrance, with this natural protection escaped mildew, while others in the open air around it suffered."

We recognize, in effect, the same protective theory in the experience of E. G. JOHNSON, of Peoria, Illinois, who states that in the black prairie, or clayed subsoil, "rot and mildew" prevail, and that vines thoroughly pruned and tied to stakes rotted badly, while those which were unpruned on high trellises escaped. An amateur, residing near, always lost his Catawbas when he cut his vines; but having stopped "stopping" them for some years past, has had no "rot" since. Finally, that he had found six cases of Catawba vines in his vicinity where the grapes did not rot, nor the vines mildew; and that in each case the vines had not been cut or pruned, and that he knew of no case where pruned vines did not rot or mildew.

Another method, which has effectually prevented the appearance of mildew, by enabling the vine to withstand the effects of excessive night radiation, is to permit the vine to trail upon the ground. Very fine crops of Concords have been grown in New Jersey, without a trellis or stake, but lying upon the ground, the fruit resting upon strips of cedar bark; these grapes had no rot, while other Concords in the immediate vicinity, tied to stakes, suffered severely from that cause. Others train their vines upon the low trellis in such a manner that the bunches of grapes will be near to the soil, and receive the warmth radiated from the surface; thereby insuring early maturity, a richer flavor, more abundant saccharine, and higher aroma, than if grown at a greater distance from the ground. Thus grapes on branches hanging within a foot of the soil have been found fully ripe and rich in bouquet, while those three feet higher were still unripe and extremely acid. This method of training, combined with Lawrence's shelters, but four feet from the soil, would seem to leave little to desire as requisite to safety of the leaf in Summer, and perfect maturation of the grape.

Sunscald and mildew often go together—sunscald produced by sudden changes of the atmosphere. It is the soft-leaved, feeble text-

ure varieties that suffer most from this disease; the leaves becoming blistered or burnt, thus affecting the fruit. The more glossy and shining the leaves, the less liable they are to sunscald. Healthy plants, dry soil, and judicious training are probably the best preventives.

The bloom on the grape, says Dr. TURNER, is an organized vegetable shield or protector. If this be broken down by abrasion, dead and decaying matter is at once provided to supply food for fungi, and this breaking down of the bloom on grapes and other fruits is *itself* the beginning of decay, that will eventually proceed in the substance of the fruit itself, in time, according to condition.

Peach Insects and Diseases.—

The *peach-tree borer* is somewhat different from that which attacks the apple tree—the latter becomes a beetle; the former a moth, depositing its eggs during the Summer and early Autumn, at the base of the trunk, from which hatches a small white borer or grub, that eventually grows to three-fourths of an inch long, and bores long slender channels in the roots, both in the bark and solid wood, sapping the very life of the tree. Peach trees should be examined repeatedly every season, and where there are signs of gum exuding between the ground and the root the borer should be traced out and destroyed. A sharp knife and a piece of flexible wire are suitable for this purpose, and June and September are appropriate seasons for the work. Boiling water poured upon the roots of the tree will destroy the grub or borer. A bank of ashes or slaked lime, or stiff clay, should be placed around the butt of each tree in the Spring, and removed in the Autumn, which will prevent the moth from depositing her eggs. Painting the body of the tree from about six inches above ground, down to, and out on the main roots, the same distance, with gas tar, mixed with a small quantity of flour of sulphur, will prove effectual against the grub; so also will hog manure, or tobacco stems thrown around the tree. Dr. WARDER says, they may be prevented by a chimney crock, a piece of stove-pipe, or a box around the base of the tree, which is to be filled with sand, gravel, or cinders, in the Spring, and removed or emptied in the Fall. A little bank of earth, or even a piece of coarse paper secured to the tree, in cone shape, will keep off the insects. Mr. BOLMER's plan of mounding has, in part, the same object.

The Yellows.—A disease very fatal to the

peach and nectarine is the *yellow*s. Whatever may have been its origin, exhaustion by deteriorated soil, overbearing, neglected pruning, and bad cultivation, develop the malady. It is contagious, and is imparted to other trees by contact or propinquity, as well as by a knife affected by pruning diseased trees, from buds taken from infected trees, and from soil in which such trees have grown. As a remedy, use iron filings or scales from a blacksmith's anvil, placed about the roots at the rate of a good shovelful or more to a tree; but probably the best preventive and cure is an application of Peruvian guano, sowed around the ground and harrowed in. Pouring boiling hot water on the trunks of the trees, and letting it run down into the ground at their base, has effectually cured them of the yellows. Or, mix in the ground with a hoe, early in August, eight or ten inches from the trunk, a tablespoonful of salt, saltpeter, and potash.

Mildew often retards the growth of peach trees of the glandless, cut-leaved varieties—a minute fungus, which may be destroyed by syringing with soap-suds, or a mixture of lime water with soap-suds, and a subsequent dusting with sulphur.

ALEXANDER DRAKE, of Albemarle county, Virginia, states that he has known a large peach orchard totally destroyed by the ravages of the worm, except three trees which, when about a year old, had a tenpenny nail driven through the body, as near the ground as possible. These three trees had always been vigorous and healthy, bearing the greatest profusion of luscious fruit. A chemical writer on this subject, says: "The oxidation or rusting of the iron by the sap evolves ammonia, which, as the sap rises, will of course impregnate every part of the foliage, and prove too severe a dose for the delicate palate of intruding insects."

Pear Insects and Diseases.—*Bark lice* are common to the pear tree. Boil leaf tobacco in strong lye until it is reduced to an impalpable pulp, and mix it with cold-made soft soap until it appears like thin paint. This should be applied with a brush to the tree and limbs in the Spring, before the buds have swollen. Tar and linseed oil, beaten together and applied in the same way, are beneficial; and strong soap-suds, potash water, and white-wash have also been recommended. To protect the trees against *worms* of every kind, practice the bandage system—wrapping the trunks of the trees about six inches above ground, and

two below, early in the Spring, with a bandage of any kind of muslin or cloth, which prevents the laying of the eggs—generally deposited an inch or two above ground—and also prevents the descent of the grub.

The *blight*, or *fire blight*, is a most formidable difficulty in the cultivation of the pear—more dangerous than in the apple, and evidently produced from the same causes. Cut off the diseased limbs some distance below the affected parts, and burn them; others cut the tree entirely off, a foot or two above the ground, about midsummer, when the early Summer growth has ceased, and the stubs will send forth vigorous shoots the following Spring, and form a healthy pyramid. This seems to be safer and better than to simply amputate diseased limbs. The blight attacks the most thrifty trees, originating in the bark, and never in the leaves; and those having imperfectly matured wood are the most subject to the disease.

The late G. P. R. JAMES, while occupying a place in Stockbridge, well supplied with pears, found the trees inclined to be drooping, and the fruit to crack, and restored health to the trees and fruit by the free use of copperas—sulphate of iron—so that this has since been one of the most productive pear orchards in Massachusetts. The refuse of a blacksmith shop, or of an iron foundry, is just the food the pear tree loves. Gypsum—sulphate of lime—is one of the cheapest and most efficient manures for the pear. Wood ashes, however, contain the greatest variety of mineral matter, and can not be too carefully treasured for the use of this and other fruits; and even when leached, their virtue is not much exhausted.

At the meeting of the Ohio Pomological Society, in 1866, Mr. SPRINGER said, as the result of forty years' observation and experience, he was convinced that blight in pear trees was in some way attributable to over-luxuriance of growth, or a plethora of sap during hot weather in Summer. He had seen much blight where trees stood in rich, moist, and well-cultivated soils, causing luxuriant growth, but none on such as were compelled by poor dry soils, or neglected culture, to grow slowly; and hence, too, he had never known the Seckel variety to suffer from blight, owing, as he believed, to its stunted habit of growth. Others concurred in these views, so far as to admit that, as a general rule, thrifty pear trees were more liable to be affected with blight than those in an opposite condition; but there were many exceptions, and the Seckel variety was not always exempt.

Dr. E. S. HULL, of Alton, Illinois, having observed that the pear blight occurred almost exclusively in those trees that were making the most luxuriant growth, and were standing in rich and highly-cultivated soil, argued that if the excessive wood growth of his trees could be checked, they might escape the devastation; and root pruning suggested itself as the readiest means, and also of the continuous cultivation of the soil for the proper development of the fruit. The experiment has thus far proved successful, but needs further trial.

Dr. J. P. KIRTLAND, of Cleveland, has used, with apparent good results, a mulching around his pear trees, dressing with a sprinkling of salt, and free washing of the bodies, and syringing the branches with a solution of the sulphate of iron. Yet a sudden and severe Summer storm, when the air would become universally charged with the cause of blight, whatever it may be—sporules of fungi?—when pears, apples, and quinces would succumb to the attack.

Dr. KIRTLAND says the blight is caused by the poisonous impressions of the seeds or sporules of a microscopic fungus, and to counteract which, combinations of iron, especially a solution of copperas, should be used.

Leaf blight is most severely felt upon seedling stocks in the nursery. It sometimes attacks trees in bearing; the leaves spot, turn black, and fall off, causing a suspension of growth, and the loss of the crop. A solution of sulphate of iron—copperas water—sprinkled upon the leaves, and saturating the ground at the foot of the tree; or, using iron water, by throwing in old nails or rusty iron, will prevent the leaf blight.

Plum Diseases and Insects.—

Black Knot is the peculiar malady of the plum. It is an eruption of the branches, causing an excrescence like great, unsightly warts, probably induced by a disease of the sap vitiated by the soil or atmosphere. The cherry is subject to a similar disease, and both referable to a fungus growth—each contagious, the cherry with the cherry, and the plum with the plum; but not with each other. If all the parts affected by the disease are cut away and burned, in May or June, the seeds for the next year's crop will be destroyed. Another remedy is to dip a paint brush in spirits of turpentine, and thoroughly saturate the knot, being careful not to touch any other part of the tree; and if any branches are pruned, burn them. This stops the extension of the knot, and the tree puts

out healthy branches below it; and during the Summer, if fresh excrescences appear, pare them off, and apply the turpentine. Another practice is, to burn woolen rags on the windward side of the tree, say early in April, which it is said prevents the appearance of the black knot and increases the productiveness of the tree.

Curculio.—The curculio, or plum weevil, is a little insect that makes a crescent-like puncture in the young fruit, soon after the petals fall, for the purpose of depositing its eggs. In some regions, and in some seasons, the curculio commits its ravages on apples, cherries, and peaches, as well as plums and apricots.

Many remedies have been suggested. The curculio is regardful of its progeny, which after the fruit falls, burrows in the earth—hence, trees planted with their tops over running water, or with a pavement of brick or stone under them, often yield full crops. But this is not always a protection, for swarms of curculios are sometimes wafted by gusts of wind from one plum orchard to another, a mile or more distant. But they mostly confine themselves to certain trees. A high board fence, or intervening buildings have been known to protect the trees from these migrating parties.

One removes the turf, if any there be, from around the trees, over a space somewhat larger than that covered by the branches, and spreading the ground with marble dust, leached ashes, blue clay, or gravel, half an inch thick, well composted and beaten down, which forms a coating impenetrable to worms or insects. Then pick up and burn the fallen plums, and a good crop may be expected the next year. Others place wool around at the base of the tree, or make bands or wrappers of coarse tow or cotton, and, kept well saturated with tar, bound around the trees two or three feet from the ground; and others fasten strips of sheep skin with the wool on, dipped in petroleum, a couple of feet from the ground, and in these traps many of the curculios are caught when attempting to ascend the trees—for though they have wings, they scarcely fly, except during quite warm weather, or in the heat of the day, and crawl but slowly.

Salt sown upon the surface in small quantities will, it is asserted, destroy the curculio—those, doubtless, burrowing in the ground. Hogs running in the orchard and eating the plums as they fall, will prove a partial remedy; and so poultry will devour large numbers of the insects and larvæ, especially if the surface

beneath the tree is free from grass, hard and smooth. Others have in the Spring excavated the ground to the roots, and placed a layer of several inches of leached ashes, and once a week, for several weeks, sprinkled a bucket of weak lye over the ashes; and others still have, in addition to this remedy, made a mush of grease, lime, and snuff, and rubbed over the body and limbs of the tree, and secured good crops of plums.

When suddenly disturbed the curculio plays possum, and falls from the tree. It is timid, and is shy of infesting trees near to or trained against buildings, or located beside frequented paths. It is nice in its senses—ashes, lime, and all foul odors disturb it. Dusting a tree repeatedly with ashes or slaked lime, while the fruit is small, at sunrise, when the dew is on the young fruit and foliage, often preserves the plums from the attacks of the curculio. A heap of fermenting manure near the base of a tree, or placed in a barrel and set under it, will frequently protect the fruit. Fumigating the trees with burning tobacco, or tobacco stems, every morning under the branches, has saved the fruit; and a mixture of lard, sulphur, and a little Scotch snuff rubbed freely upon the body and branches, has had the same result. Smoking the trees with sulphur thrown upon a kettle of coals beneath, with an occasional piece of leather or woolen rag, has had a similar effect. Drenching the trees repeatedly with some offensive ammonia generating fluid—urine or the draining of a manure heap, with a handful of salt and flour of sulphur, allowed to ferment, with the addition of some wood ashes or lime when you are ready to apply it, and throw the mixture with a dipper over the whole tree, as soon as the petals fall and the fruit is formed, and repeat as often as washed off by rain, until the plums are nearly grown. Take a barrel just emptied of gas tar, and fill it with water, letting it stand a couple of days until it becomes as dark colored as coffee, and pungent as creosote; with it drench the trees on the first appearance of the curculio, and repeat it every two or three days for two or three weeks. Three or four open fruit bottles have been placed under each tree, containing a mixture of benzine and coal oil, and an old benzine barrel placed under another, and in each instance a fine crop of plums was secured, while other trees near by, unprotected, lost all their fruit.

But the jarring remedy, after all, is perhaps the one most in practice. Some spread loose

sheets beneath the tree, and with an ax or hammer strike sharply against the sawed stump, if there be one, of a limb, which will cause the curculios to tumble down upon the sheets. This should be repeated every morning early, while it is cool, and the curculio is in a semi torpid state, as the sudden jar, causes him to loosen his hold, when he is too stupid to fly. Merely shaking the tree will not answer—it must be jarred sharply. The insects and defective fruit thus secured should be thrown into hot water or the fire for their effectual destruction. This would seem to be an easier and more certain mode of destroying the curculio than to jar them down and spade them eight or ten inches beneath the soil, and repeat the process as frequently as would be necessary. By this jarring remedy, nearly two hundred curculios were caught each morning during the first week from a single tree; they were reduced to less than one-half the second week, and afterward to small numbers. The next year, as the punctured plums had been carefully destroyed, the number was lessened more than one-half; catching the first morning, seventy-four; the second morning, ninety-three; the third morning, sixty-six; the fourth morning, twenty; the fifth morning, nine.

The curculio-catcher of Dr. HULL, of Illinois, is an admirable contrivance. It consists of an apparatus like an inverted umbrella, only considerably larger, with an opening on the front side to take in the trunk of the tree. This is attached to a wheelbarrow, the shafts of which extend a little past the front of the wheel, with a strong cross-piece in front—so that when the barrow is wheeled suddenly against the tree, the cross-bar in front strikes it, and jars down into the trap the curculio and imperfect fruit. These naturally accumulate in the lowest part, where there is an opening in the canvas, which communicates with a box or bag below, from which they are taken and destroyed; or, it may be, a tin dish partly filled with some destructive fluid. If the curculio-catcher could be so constructed as to fold up in passing through a garden gate, or when not in use, it would add much to its convenience.

The Plum Gouger.—This insect is better known in the West than in the East. Dr. WALSH has studied and described its habits. It differs from the curculio. The latter, streaked and spotted with black and white, has two shining black humps on its back; the gouger is clay yellow in front, and of a dull-lead color behind, without any humps at all. The curculio cuts

a crescent slit in every fruit in which it lays its egg, while the gonger bores a small round hole for this purpose. The curculio larva leaves the fruit and goes under ground, while the gonger larva remains in the infested fruit. The curculio is a shy flier, while the gonger flies quite readily; both species, however, can be jarred off the trees and destroyed. The curculio produces two broods every year; the gonger apparently but one.

The *plum moth* Dr. WALSH describes as an "elegant little jewel of a moth," and expresses the hope that it is not an enemy of the plum, but only burrows in the egg-slit made in the fruit by the curculio.

The *plum leaf louse* is much less common than those which pertain to other kinds of fruit trees, and the same remedies should be applied as for the apple louse. The *peach borer* sometimes attacks the roots of the plum, and should be watched and dug out.

Enemies of the Quince.—The *blight* is similar to that of the apple and pear, and should be treated in the same way. The *borer* attacks the wood of the trunk near the surface of the ground, and works inward, and usually upward, but sometimes downward, to a distance of several inches, during the Summer. The cutting-out process, as in the case of the apple borer, must be resorted to.

Rose Bug, or Chafer.—This is a buff-yellow beetle, with shining yellow legs, and very long black feet, appearing the latter part of June, and feeding mostly on the blossoms and leaves of the rose. Hand-picking when the dew is on, and they are torpid, or, early in the morning beating and shaking them from bushes upon sheets, and crushing or burning them, is a safe but somewhat tedious remedy. Pulverized slaked lime sifted over the bushes, and shook off ten minutes afterward, is claimed to be an effectual remedy. They sometimes attack the grape, apple, cherry, and plum.

The *saw fly* of the rose appears as a fly; the females when about to lay their eggs, unsheath their saws, and thrust them obliquely into the skin of the leaf, depositing in each incision thus made a single egg. From this in ten days emerges a caterpillar, which feeds upon the leaves, and finally enter the earth, change into flies, and re-appear in August to renew the process. Syringing the bushes with a decoction of tobacco, not too strong, has been recommended; but the best remedy for this pest, and the *rose slug*, is a mixture of whale-oil soap and water,

in the proportion of two pounds of soap to fifteen gallons of water, and drenching the bushes with it with a garden syringe, or small bush broom, at intervals of six or eight hours apart, and repeat it for several days. The frequent use, in moderate quantities, of chamber lye, poured upon the roots of the rose, which the bush and leaves seem to absorb, prove so distasteful to worms and slugs, they soon disappear. The *thrip*, a small insect, and *bark lice*, often infest rose bushes, and require frequent drenching with the above decoctions; sulphur dusted on several times a day, in the early part of the season, while the thrip are small, is a good remedy—it not only kills the young thrip, but prevents mildew.

Strawberry Enemies.—Strawberry plants, vigorous and healthy, are seldom attacked by insects. The red spider, green fly, or aphid, are sometimes troublesome to plants in pots; but flour of sulphur scattered freely among the plants will destroy the spider, while tobacco smoke, or syringing with tobacco liquor, will eradicate the aphid. Dusting with fresh slaked lime the entire surface of the soil, will generally destroy slugs, snails, and wire worms; ants should be treated with a dose of hot water or guano; and the grub or cut worm, eating off the roots close to the crown, should be dug up beneath the ruined plant and killed.

The strawberry beetle may be largely destroyed in this way: Make numerous piles of dry brush and other ignitable material, and then watching the season when they begin to rise, and in the early part of the evening, fire several of the brush heaps, and the beetles and all other insects that chance to be on the wing, being dazzled and bewildered by the light, fly into the fire and are consumed. The next evening, fire other heaps, and so on. The top of a small tree should be stuck in the ground in the middle of the pile, against the branches of which the beetles will strike and fall directly into the fire. If farmers and cultivators could be persuaded to practice some such course annually, it would be found to be very effectual in diminishing the numbers of those depredating insects, and largely increasing all kinds of crops.

ENEMIES OF GARDEN AND FIELD CROPS.

Nothing is more destructive to insects than a proper rotation of crops. The eggs of many

insects are deposited in the straw or in the ground, which has furnished the parent with food and lodging during the Summer, so that when hatched by the warmth of the season, the young find their appropriate food close at hand.

Thus, the longer a piece of ground is cultivated with any particular crop, so much the more destructive will be the insects which prey upon it; for, all the conditions being favorable, they multiply in compound proportion the longer the system continues. Especially is this the case upon those fields where a regular rotation is not considered necessary to success. This fact would seem to suggest, that a change of the crop would prove very advantageous in all cases. Thus, when a piece of land that has been allotted to onions for several successive years, becomes uncertain by reason of the depredation of the maggot, the readiest way to clean it would seem to be to cultivate some other crop—one not at all adapted to the taste of the insects which occupy the ground.

In a recent communication by Mr. OLIVER, a member of the Institute of France, to the Royal and Central Agricultural Society of Paris, a description was given of all the insects which live upon the crown or collar of the roots of the grain-bearing grasses, such as wheat, rye, barley, and oats, in which it was shown that "they multiply themselves without end when the same soil presents the same crop for several years in succession, or even a crop of an analogous species. But when a crop intervenes upon which these insects can not live, as beans, beets, turnips, after wheat and oats, then the whole race of insects perish from the field for want of proper nourishment," and the next year the farmer can return his land to the accustomed tillage without apprehension that the insects will rob him of the proceeds of his toil.

The use of coal oil as a protection from garden insects, is recommended by the *Gardener's Monthly*. Put a table-spoonful of coal oil into a common garden water pot of water, sprinkle it over the beds where the beetle is noticed, and it will quickly destroy the whole brood. Coal oil serves a double purpose, dealing out death to insects and acting as a manure to vegetation.

Ants.—Various methods are resorted to for the destruction of these little pests in gardens and around fruit trees and shrubbery. Those whom they annoy have recourse to copious and repeated inundation of their burrows with boiling soap-suds; or to digging up their hills in the midst of Winter, and destroying the colony by the exposure; or to shaking a large

sponge full of white sugar, and placing it where they will creep into it, and when they are caught in the trap dousing them into scalding water. Each of these plans has been used with success. A daubing of tar at the base of fruit trees will generally keep the ants at a distance.

M. GARNIER has announced "an infallible method" for getting rid of ants. In a corner of his garden, infested with legions of these insects, he placed four saucers containing sugar and water, with the tenth of its weight of arsenic in the mixture. A number of ants immediately invaded the saucers, but were soon after perceived staggering away, as it were, and some being even engaged in dragging their dead comrades away. From that moment they disappeared from the garden, and on the following day not a single one was to be seen.

Army Worm.—This pest of the farmer has frequently made its appearance in our country. Dr. FITCH states that in 1770 it overran portions of New Hampshire and Massachusetts, first appearing in July, at first not longer than a pin, reaching at maturity the size of a man's finger. They marched up the sides of houses, and over them, completely covering entire buildings; utterly destroying all fields of wheat and corn, as if by magic, while flax, peas, potatoes, and pumpkins escaped their ravages. Trenches dug a foot deep around fields of grain for their protection, were soon filled, and the millions in the rear passed over and took possession of the interdicted field. About the first of September they suddenly disappeared. When the army worm invaded portions of Illinois, in 1861, by prompt ditching they were kept out of the corn, but they swept the meadows and pastures clean, except clover.

Asparagus Beetle.—This insect has but recently migrated from Europe to Long Island—is of a deep green, blue color, ornamented with yellow spots. Picking them off the plants with their young, by hand, and destroying them, is the only known remedy.

Barley Fly.—The black-legged or Massachusetts barley fly, and the yellow-legged or New York barley fly, have, at different periods, infested the barley crops of those States, diminishing the crop in the latter State from forty to about twenty bushels per acre.

Cabbage.—This plant like the broccoli and cauliflower, has many enemies. The cabbage fly begins its work of destruction while the plants are yet quite small; powdered tobacco sifted upon the plants, and several times re-

peated, will prove an effectual remedy. The *thousand-legged worm* is an enemy to cabbage, and other garden vegetables; and when not on its travels, may be found under chips or in crevices, and should be hunted and destroyed. A crop of young chickens prove a fine exterminator of these worms, as well as of many pestilent insects. Toads are the best protection against lice. Pennyroyal or green hemp tops scattered on cabbages, prove very distasteful to bugs.

Cut Worm.—In the garden the cut worm destroys cabbage and other young plants, and should be searched for, during the latter part of May and until the middle of June, whenever it has committed a depredation, for it will be found secreted in the ground near the spot. Pour hot water over a pound of aloes, in a pan, and stir it until the water can dissolve no more; then pour it into an empty whisky barrel, and fill it with cold water. Pour this solution on and around each cabbage plant, and a single application generally suffices to ward off the cut worm; if the solution should be made somewhat weaker, and applied once a week, until the cabbage attained too great a hardness for them to cut, it would prove still more effectual.

It is said that a handful of oil meal in each hill of corn will furnish food for the worm, until the plants are grown too tough for its attacks. Flour of sulphur scattered on each hill, with an occasional application of whale-oil soap-suds, lime, and wood ashes, will protect the corn from the cut worm. A more certain remedy is, after the corn is up, to sprinkle a handful of salt around each hill; or mix a bushel of finely-ground salt with four bushels of plaster, and apply it with the hand around and over each hill, just as the corn is shooting above the ground—the plaster serves to diffuse the salt more completely, and attracts and retains the moisture so as to preserve the salt longer than any other substance. This mixture would be excellent in the garden. Thrust down a round sharp stick two or three inches deep, say three-fourths of an inch in diameter, on each hill; and repeat it five or six times to a hill; these holes will serve as traps into which the cut worms will fall during their peregrinations, and can be easily killed. When a new old shingles, or something of the sort are scattered around, the cut worms will hide beneath them, and can thus be easily captured.

Dr. FITCH says of the large black beetle, with

most brilliant golden dots placed in rows on his back: "The eggs produce the *corn-grub killer*. It is a most inveterate foe of the cut worm, grasping the worm in its strong jaws, and, in spite of its violent writhing and struggling, securely holding it. When it finds these worms in plenty, it gorges and surfeits itself upon them till it is so glutted and distended as to be scarcely able to stir, for it never knows how to let a cut worm alone when it meets him. It is continually hunting these worms, feeding on nothing else if it can obtain them. Both it and the golden-dotted beetle, which produces it, therefore, should never be harmed."

Cotton Caterpillar, or Cotton Army Worm.—This is the great pest in cotton cultivation. It is not necessary to describe its habits and transformations. Fires built at twilight in and near the cotton fields, would burn up a great many moths; large shallow plates or dishes, filled with molasses and vinegar, or some strong aromatic substance, have been used in dry weather on a small scale, with success, especially when the moth makes its first appearance; attracted by the sweet scent, they crowd into the plate, and are drowned. A preparation of arsenic mixed with syrup and rum, in dishes, or besmeared on boards, would, doubtless, serve a good purpose in their destruction. Heavy frosts sweep the caterpillars out of existence.

Fungi.—Botanically considered, fungi belong to the cryptogamous or flowerless series—which, according to GRAY, are divided into the following classes: 1. Acrogenous plants, including the rush, ferns, etc. 2. Anophytes, including mosses, etc. 3. Thallophytes, including the lichens, fungi, sea-weeds, mushrooms, molds, etc. To the fungi belong the whole family of rusts, smut, and bunt, which creep through the tissues of living plants, and finally burst forth on the exterior, and fructify in dense, dusty masses, which cover their whole surface.

The conditions, says W. C. FLAGG, favorable to fungoid growths are those also favorable to electrical developments, and to a certain extent those conditions may be regarded as one—the electrical. Electricity, according to Dr. CARPENTER, in his *Vegetable Physiology*, "has evidently a striking influence on the rapidity of their growth—some plants having been known to increase in the most extraordinary manner during thundery weather." The electrical condition may, perhaps, therefore be reduced to that of overgrowth and consequent feebleness in the plant, rendering it, as when otherwise weakened, liable to fungoid attacks.

There remain, then, two facts to be held in view:

1. Feeble vegetable growth, whether caused by excessive or insufficient development.

2. Fungi, also vegetable, ready to seize upon such enfeebled growth, especially in moist, warm and electric weather.

The first point in practice, then, is to secure a healthy vegetable growth. We must,

1. Cultivate enough, especially old plants.

2. Not cultivate too much, especially young plants.

3. Avoid wet roots—drain.

4. Avoid excess of dryness—mulch.

5. Avoid a dead atmosphere—plant on breezy sites, at good distances, with a good circulation of air under the plants.

6. Avoid excessive extremes of heat and cold—protect orchards.

7. Avoid shocking the vitality of the plant by cutting, etc.—be careful how you prune.

Failing in these points, or any of them, we may succeed by the application of sulphur and its compounds in such manner as to destroy the seeds or vegetation of fungi.

Grain Aphid.—A species of plant louse, for which no remedy has yet been discovered. Fortunately it is but a transitory evil, and nature has provided a number of other insects which are its inveterate foes, which slay and feed upon them.

Grasshopper.—The Northwestern locust, or hateful grasshopper of Dr. WALSH, who says of it, that it is about seven times as destructive to garden crops as it is to those of the field. It started from the Rocky mountains, and passed into the lowlands of Texas, Kansas, Nebraska, western Missouri, Iowa, and Minnesota. Dr. WALSH thinks it can be demonstrated that it can not pass the Mississippi for centuries, if ever. In Texas, successful experiments have been tried, of the planters plowing their fields, as soon as the grasshopper has laid its eggs, burying and crushing them under layers of earth.

Hop Aphid, or Louse.—Whole crops are sometimes destroyed by this mortal enemy of the hop plant. Syringing or showering the vines with strong soap-suds or with a solution of oil soap in the proportion of two pounds of the soap to about fifteen gallons of water, is a very common remedy. But a simple decoction of tobacco, strong enough to kill ticks on sheep, or the blue louse on colts or calves, is probably more effective. Others use a mixture of strong soap-suds, made with soft soap and tobacco

water, with one pound of copperas to every five gallons of the liquor, applied with a syringe or force pump, to the under side of the leaves where the louse always first appears. Others have sown in their hop yards patches of buckwheat, which being odoriferous attracts the insect, and probably affords more nutriment than the hop vine, thus relieving the hop of its presence. The *mold* or *blight* is sometimes fatal to the hop, spreading fastest in warm, damp weather. It commences near the ground, and therefore great attention should be paid to the frequent pulling off of the suckers as they appear through the hill during the Summer months. Every spotted leaf should be destroyed. The site of the hop plantation should be such as will secure a free access of air and sunlight, for dryness is a check to this disease.

Oats.—This crop sometimes *rusts*, occasioned perhaps by excess of heat and moisture, as on wheat. A minute worm has been detected on rusty oats by microscopic examinations—whether the cause or the result of the disease is uncertain. Some oat crops, badly rusted in Illinois, have been reported as producing death when the straw was fed to horses. It would be prudent not to use the seed of a rusty crop for the next year's growing, nor to use the same ground the next season for a small grain crop.

Onion Fly.—The eggs of the female fly, deposited on the base of the stem near the ground, hatch out in a few days, when the larvæ or maggots immediately penetrate between the leaves to the bulb, upon which they prey unseen, and in four or five weeks emerge a perfect fly. It is about half the size of the common fly, of an ash-gray color, with a few thinly scattered hairs covering the surface of its body. They appear to show more predilection for the white onion than for any other. Soaking the seed in a solution of copperas, and two or three times during the season sprinkle the growing onions with it, is a remedy for the onion fly. Sprinkling an equal quantity of tar and hot water, after being well mixed and standing a few hours, upon the onions, rids them of the fly or worm; while another practices with success the pouring a full stream of boiling-hot water from a large tea-kettle spout directly on each row, repeating the application several times. Burning over the ground upon which the bed is to be made, a covering of ten or twelve inches of straw, has proved successful. Beds made on ground where charcoal pits

have been burned, are entirely exempt from the fly; hence strewing powdered charcoal over the beds has been warmly recommended.

Parsnip and Parsley Worm.—A large, thick-bodied, green worm, with black bands, each of which bands has six yellow spots, infests the parsnip, parsley, and caraway, eating the leaves, and finally transforming into a butterfly, should be picked off the leaves and killed.

Pea Beetle or Bug.—Peas sown as late as the middle of June are seldom infested with the weevil or bug, because its period for depositing eggs is then past. It is a good practice to sow peas for the next year's seed very late in the season. A second crop of peas from the seed of the first crop will be entirely exempt from the weevil. Putting peas in a tight vessel, and mixing two ounces of pulverized camphor, or a table-spoonful of sulphuric ether, to each bushel of peas, will effectually kill all the bugs in them in a few days.

Potato Beetle or Bug.—The *three-lined potato beetle*, with three stripes lengthwise of its yellow body, having considerable resemblance to the cucumber beetle, has always been common upon the potato vines, feeding upon the leaves, both in its larva and matured state. While the cucumber beetle has a black head, this potato beetle has a yellow one.

The *ten-lined potato beetle*, or Colorado bug, was known upward of forty years ago upon the upper Missouri and Arkansas rivers, several hundred miles west of the Mississippi; but it was not till 1861, that it suddenly commenced its attack upon the potato in Kansas and western Iowa, and has since been steadily advancing eastward. This beetle is of a regular oval form, very convex above and flat beneath, of a hard, crustaceous texture, smooth and shining, of a bright straw-yellow color, with ten black stripes upon the back of its closed wing covers. It is a slow-flying insect, and propagates freely and rapidly, and is proving the worst enemy the potato ever encountered. Dr. WALSH estimated the damage done by this insect, in a single year in the Northwest alone, at one and three-quarter millions of dollars.

There is no certain relief from its ravages. Rotation in cropping the potato avoids encountering that portion that burrow in the ground where the previous crop was produced, and new land is especially desirable. In some localities millions of the beetles have been decoyed into fires, built at twilight and early evening in and around the potato fields, and thus destroyed. It has been suggested that an

early mulching will prevent the full grown larvæ from getting into the ground, where they go to complete their metamorphosis, and get ready to pair and lay, and thus tend to drive them from the field. Burning the potato vines immediately after digging serves to lessen their numbers. Sprinkling white hellebore, at the rate of a pound to a hundred hills, has not been found so useful as in the case of worms and lice; soot, slaked lime, and a mixture of six quarts of ashes and one pound of sulphur, have been severally used with considerable success; and so has a mixture composed of one pound of Paris green, half a pound of sulphur, and three-fourths of a pound of ashes—or omit the sulphur and increase the quantity of ashes, which chiefly serve to dilute the Paris green, a deadly poison, quite as likely, if too strong, to kill the leaves of the plants as the beetles. Several solutions have been recommended to apply with a sprinkler to each hill, morning and evening: One, a pint of salt dissolved in a pail of water; another, a gallon of kerosene or coal oil to a barrel of water—some advise one-third oil to two-thirds water—well mixed, and kept stirred while using to prevent the oil from rising on the surface; a strong decoction of mayweed, and probably a dilution of creosote. Many gather them in spittoon-shaped or funnel-like dishes, the bugs passing into a basin or bag below, from which they can not emerge until taken out to be destroyed.

In treating of the field crop of potatoes, reference is made to deep planting and sprinkling air-slaked lime in the hill, and among the potatoes in the bin, as preventives of *potato rot*.

Blistering Beetles, or Cantharides, with their ashen-gray bodies, thickly covered with a very short down of that color, make their appearance on the potato vine about the 20th of June, and in August go into the ground and lay their eggs. They require similar treatment to the potato bug.

Radish Fly.—The larva of the radish fly is a maggot, which gnaws irregular spots on the outer surface of the radish leaf, and bores long and winding worm tracks in the interior of the root. Copperas water, or similar applications for ridding vegetables of worms and lice, should be used.

The *rye fly* differs from the joint-worm fly in having the hind shanks, as well as the forward ones, a dull pale yellow, the middle pair only being black. It has, in former years, done much injury to rye and wheat in the Susquehanna Valley, Pennsylvania. Sowing rye

where the ground has been cultivated by a hoed crop the preceding year is a preventive of the fly.

Tobacco Enemies.—Cut worms are to be looked after and destroyed immediately after setting, and as long as they work. When the plants get a foot high, often before, the green worm commences; at first, small, round holes are seen in the leaves; on the under side will be found a small, light, green worm, about half an inch long, and no larger than a small needle. A moth lays the eggs, fastening them to the under side of the leaf near where the worm does his first mischief. The eggs are a little lighter green than the leaf, and about the size of a small pin's head—destroy all found, and keep the plants free of worms by going through frequently and collecting them; feed them to the poultry, or kill them. Grasshoppers and crickets also eat the leaves, making the tobacco look ragged when near grown. Any usual remedies would injure the quality of the tobacco; hence hand-picking of the worm is the chief mode of their destruction. Birds, however, destroy large numbers of them, and a yellow wasp, or hornet, destroys not a few while young or partly grown. Numbers of the large, clumsy, gray-looking fly, producing the tobacco, or tomato worm, may be easily destroyed by a person walking over the ground in the evening or night with a torch, and a light paddle with which to kill them, as they are attracted to the light.

Turnip Fly.—The English farmers steep the seeds in oil, and afterward dust them with sulphur, preparatory to sowing them, and this mode is conducive of considerable good; but fine air-slaked lime is better, or a mixture of air-slaked lime and soot, or ashes, carefully sifted through a fine sieve on the plants as soon as the fly makes its appearance, and while the dew is yet on them.

Vine Insects.—The striped bug, so destructive of cucumber, melon and squash vines, is driven from his field of operations by a strong decoction of elderberry sprinkled over the plants; lime freely scattered upon the ground gives off a gas extremely noxious to most insects; coal tar on corncocks placed near the vines; plaster or gypsum, pulverized charcoal, common road dust, soot, tobacco dust or snuff; kerosene oil on a feather passed lightly over and under the plants; a mixture of tobacco and red pepper sprinkled over the vines; are all more or less successful. Cornmeal sprinkled over vines attracts ants; and, thinking the bugs are after

the same food, they give them battle, kill and drive them off. Coops of chickens, and especially young ducks, prove very efficient insect destroyers. Benzine is very efficacious, as it suffocates nearly all the garden pests. A spoiled clam, or fresh fish, or a lock of wool soaked in fresh oil or guano, placed near the root of a vine, will drive off bugs. A decoction of camomile leaves, or the pulverized leaves and blossoms of a species of the fever-dew, closely allied to the camomile, have also proved successful; and it would be advisable to have some plants of these herbs planted in various parts of the garden. Others plant a few beans in the center of the hill, and when the vines are out of reach of the bugs, remove the beans.

For plant lice, use a strong decoction of tobacco; or four ounces of quassia chips boiled in a gallon of soft water ten minutes, with four ounces of soft soap dissolved in it while cooling, and sprinkled upon the vines, on the upper and under sides of the leaves.

Some persons take two small twigs of osier, or other slender wood, some two feet long, thrust into the ground and bent over the hills, crossing each other at right angles; and then place a newspaper over these curved sticks, completely enveloping the plants, and kept in place by small stones, or a covering of earth on the edge of the paper. The plants are thus protected from the bugs, and grow very rapidly; and, as they outgrow their prison-house, an aperture can be torn in the upper part of the paper, leaving the sides still to afford them some protection. Or, a box without a bottom, placed over the hill, with or without a glass top, or covered with milenet or musketo bar, is often used with good success.

The *borers* in cucumber, squash, and melon vines often destroy entire patches. The *squash borer*, a sixteen-legged caterpillar, nearly an inch long when grown, eats into the vines, usually pretty close to the crown of the plant, in August. This is produced from a moth, which lays its eggs on the stem of the vine, pretty near the crown; hence it is advised, to prevent the laying of the eggs, to cover the vines lightly with earth up to the first flower, which debars the moth from laying her eggs on her favorite spot; but, when the vine is seen drooping, dig out the caterpillar in the stem near the root.

Wheat Enemies.—The *angmois moth* was long since introduced from Europe into the Southern States, where it has spread, and is one

of the most destructive insects in wheat, barley, oats, and corn. It is only upon the ripe grain that it preys, attacking it in the field before harvest, and subsequently in granaries, mills, and storehouses. Subjecting the grain to the heat of an oven or very hot room, will destroy the moth—it will bear heat for a short time to about 190° Fahrenheit, without losing its germinating powers, and brisk friction and agitation of the grain will also kill these insects.

The *chinch bug* is a small insect, about a third of an inch long, with a dark brown or black body and white wings, of the bed-bug order and odor, often proving very destructive to wheat crops of the South and West—more especially to Spring wheat. It likewise attacks corn. Unlike the midge, it is most abundant in dry seasons, and is repelled or destroyed by wet weather. At its different stages, it is known as the young fly, hard shell, black coat, and red coat. The chinch bugs seek burrows among the clods and loose earth, beneath which they make nests and propagate. Faithful harrowing will destroy them by countless thousands, while the weight of a heavy roller, following the grain drill when sowing, will crush, pulverize, and pack the earth so firmly upon the grain sown as to prevent the chinch bug from burrowing and depositing her eggs near the grain. A second rolling, if by wetting and drying, cracks or fissures should occur to harbor a new crop of bugs, even if the grain should be four or five inches high, will smash or entomb them. If the roller is too light, make a crib on top, and load it with stone. Sowing salt at the rate of half a bushel to the acre has been found an effectual remedy, while adjoining fields of grain, where no salt was sown, were literally overrun and destroyed. The free use of unslaked lime to destroy the eggs in the ground, and plowed in after a rain, and then left for Spring plowing, with some other than a grain crop, will serve greatly toward the extirpation of the chinch bug. Others have set up boards edgewise, inserted slightly in the ground to keep them in position, keeping the upper edge of the board constantly moist with coal tar, renewed every day; outside this fence a row of deep holes were dug about ten feet apart. The bugs were repelled by the boards with their tar coating, and wandering around, fall into the pits, from which immense quantities are frequently taken and destroyed. Intensely severe Winters, and other natural causes, have apparently rid our country of this pestilent scourge.

The *grain weevil* is a small, oblong black beetle, though of a chestnut-red tint when first hatched, which deposits its eggs in the grain, where it hatches, and the larva eats out the interior, leaving only the bran or shell. Kiln drying the grain is recommended as the best mode for arresting the evil. Half a pound of salt mixed with a bushel of grain, will, it is said, not only prevent the weevil, but make better flour.

The *Hessian fly* is a small insect closely resembling the musketo in appearance, but a third smaller, and has no bill for blood sucking. Instead of attacking the kernels of grain, like so many of the wheat enemies, it attacks the root and lower part of the stalk, thus destroying not the seed merely, but the whole plant. It was introduced into our country by the Hessian soldiers who landed on Staten and Long Island, in August, 1776. It is probable that nine-tenths of every generation of this fly is destroyed by parasites. To elude its attack, a fertile soil and late Fall sowing are the most successful expedients. It does not make its appearance in regions where Spring wheat is exclusively cultivated.

The *joint worm* has proved more destructive to wheat in some of the Southern States than any other insect. It much resembles the Hessian fly in its mode of attack, but differs by occupying the substance of the sheath, straw, or joint, producing hardened vegetable tumors—instead of merely resting, like the Hessian fly, between the sheath and straw. As it remains in the straw through Autumn and Winter, it may be destroyed, and its ravages lessened, by burning the straw.

Smut and Rust.—These fungus diseases have been fully treated in connection with the culture of wheat. A solution of blue vitriol has been found very efficient in destroying smut; but in ordinary cases, wash seed-wheat first in clean water, and then in brine, then spread it on the barn floor, and dust it with dry powdered water-slaked lime, stirring the whole well together.

The *wheat midge* is a very small fly, about a third of the size of the musketo, which it resembles in appearance, and is of a bright lemon color, with clear glassy wings. Its eggs produce small bright orange-yellow worms or larvæ, which when fully grown, in three or four weeks, are scarcely the tenth of an inch long. These minute insects have, by their ravages, caused a loss of hundreds of millions of dollars to our country. They come out of the ground about

the middle of June, and can not endure a dry atmosphere, and hence are most active during the night and moist periods, laying their eggs between the chaffs of the wheat ears, and the young abstract the milky juice from the kernels, whereby the latter become shrunken and dwarfish. Late sowing of wheat will delay its heading until the season for the midge to deposit its eggs has nearly or quite passed by. Carefully burning the screenings of the fanning mill when they abound with the yellow larvæ of the midge, and turning under the wheat stubble immediately after harvest, burying such of the larvæ as may remain in the field, will greatly tend to diminish their numbers. Notwithstanding it has a parasite, which causes many of the midge to perish, yet it continues to be numerous and destructive. The Mediterranean, Diehl, and some few other varieties, have largely escaped the midge.

Wheat thrips are an exceedingly minute, active, long and narrow six-legged insect of a bright yellow or a shining black color, that appear upon wheat heads in June and July, exhausting the juices of the kernels, and rendering them dwarfish and shrivelled. The wheat-midge worms, small as they are, appear like giants when placed beside those of thrips. It is late sown wheat that suffers most from this

insect; and early sowing is the only remedy thus far recommended by the wheat growers of the country.

Vermin Antidote.—Rats and other vermin are kept away from grain by a sprinkling of garlic when packing the sheaves.

Wire Worms.—This is a slender, worm-like, yellow or buff grub, similar in smoothness and hardness to a piece of wire. HORACE GREELEY has destroyed the wire worm on corn by a moderate application of salt. Five or six bushels of salt per acre is death to the smaller vermin, when followed by rain—for merely dry salt is ineffectual. Some sow oil cake with corn, and others apply plaster and lime, for the destruction of the wire worm. The starving remedy has proved successful—letting the land go fallow one year, plowing it three or four times during the season, so that no green thing is permitted to grow; the worm does not like this kind of diet, and is literally starved out. Another experimenter says, that three crops of buckwheat, potatoes, beans, or peas will entirely starve out the wire worm. Still another recommends one pound each of aloes and sulphate of iron, dissolved in water heated to 90° or 95°, and poured over one bushel of grain, and in a similar proportion for a greater or lesser quantity before planting or sowing.

WOOD FOR THE FARM:

ITS CULTURE FOR TIMBER, FUEL, AND PROTECTIVE TREE-BELTS.

Destruction of Forests.—"The most notable and serious modifications effected by man's agency," says Hon. GEORGE P. MARSH, in his able work on Man and Nature, "are those caused by the destruction of forests. The cutting away of wood not only changes the appearance of the landscape, and the character of the spot laid under the ax; but when practiced to a large extent, its effects extend to great distances—perhaps over the whole continent, and almost revolutionize climates, soils, and surfaces. The forest retards evaporation, and offers an effectual barrier to the wind. Its porous soils, and still more porous accumulation of vegetable debris, absorb and retain the moisture, and its tangled masses of sticks and roots restrain the fury of torrents, and prevent the devastation they might otherwise occasion. From these circumstances, it is free from the extremes of Summer and Winter temperature, it acts as a constant condenser of moisture in the atmosphere, and promotes frequent and copious showers. When the forests are taken away, these conservative elements go with them. The order and character of the seasons are disturbed; they become more uncertain, the lines that divide them less distinct. NOAH WEBSTER observed this fact in America, even before the commencement of the present century. Said he in 1799: 'When the forest is gone the reservoir of moisture stored up in its vegetable mold is evaporated, and returns only in deluges of rain to wash away the parched dust into which that mold has been converted. The well-wooded and humid hills are turned to ridges of dry rock, which encumbers the low grounds and chokes the water-courses with its debris—and except in countries favored with an equable distribution of rain through the seasons, and a moderate and regular inclination of surface—the whole earth, unless rescued by human art from the physical degradation to which it tends, becomes an assemblage

of bald mountains, of barren, tuftless hills, and of swampy and malarious plains. There are parts of Asia Minor, of Northern Africa, of Greece, and even of Alpine Europe, where the operation of causes set in action by man has brought the face of the earth to a desolation almost as complete as that of the moon; and though within the brief space of time which we call 'the historical period,' they are known to have been covered with luxuriant woods, verdant pastures, and fertile meadows, they are now too far deteriorated to be reclaimable by man; nor can they become again fitted for human use, except through great geological changes, or other mysterious influences or agencies, of which we have no present knowledge, and over which we have no present prospective control'"

As Affecting Civilization.—It may be added that the entire removal of forests affects the character of society as much as it modifies vegetation. It is obvious that a land destitute of forests, like a land entirely covered with forests, is naturally best suited to the condition of barbarous peoples; and the history of nations show that such countries actually are inhabited by savages. The maintenance of a due proportion between the cultivated soil and the woodland is essential, to enable man to enjoy a high degree of cultivation. As extensive forests are removed, and the area is brought under culture, civilization advances until a certain breadth of plowing and pasturage is reached; but if the removal of trees be carried beyond the proper proportion, society feels the effect of the fraud, and exhibits an unmistakable tendency to revert to barbarism.

European Experience.—Nearly three hundred years ago, the far-seeing BERNARD PALLISSY, who died in the bastille for his religion, protested earnestly against the wholesale destruction of the woods of France, saying: "I can

not enough *detest* this thing, and I call it not an error, but a curse and a calamity to all France." But the destructive changes occasioned by the agency of man upon the flanks of the Alps, the Appenines, the Pyrenees, and other mountain ranges in central and southern Europe, and the progress of physical deterioration, have become so rapid, that, in some localities, a single generation has witnessed the beginning and the end of the melancholy revolution. M. BEEQUEREL has proved by experiments that rains have been considerably more abundant in the wooded than in the unwooded regions of France.

During the wars of the First NAPOLEON, such was the extraordinary demand for Italian iron, that the furnaces of the villages of Bergamo were stimulated to such great activity that the ordinary supply of charcoal was insufficient to feed the furnaces and forges, hence the woods were felled, the copses cut before their time, and the whole economy of the forests was deranged. At Piazzatore, there was such a devastation of the woods, and consequently such an increased severity of the climate, that maize no longer ripened; and when an association formed for the purpose, effected the restoration of the forests, the maize flourished again as before.

According to a recent report, it appears that in Switzerland the forests have been destroyed at such a rate that they do not now yield an adequate supply for the present inhabitants, while their absence has greatly increased in violence the occasional inundations. The higher mountain regions have heretofore been considered the store houses of wood for the most populous parts of level Switzerland, and for foreign countries; but the depredations have been so extensive that many of the inhabitants are now suffering for the want of wood, and some of them are compelled to convey their fuel from six to twelve miles UP the mountains. If the future forests, says this report, should not be better managed, and their too extensive removal stopped, they would soon be entirely ruined in some parts of these mountain regions, and then there would prevail such a state of things as already exists in Asia Minor, Greece, a large portion of Italy, Spain, southern France, etc., where forests abounded in former times. The decrease of fertility on the Alps, and especially on the upper boundary, the disappearance of the forests in the higher regions, the unfavorable changes of the weather during the time of vegetation, the frequent and extensive devastations by floods, avalanches,

and precipitation of rocks, and large landslides on the sides of the mountains, filling up the valleys, are chiefly occasioned by the extensive clearing of the forests, and the careless management, or rather, the mismanagement of those entrusted with its performance; and those persons must now ascribe the largest share of the misery which has and will befall them, to their selfishness, and their disregard of the laws of nature.

Its Influence in other Lands.—The able report of Judge KNAPP and associates on the Forest Trees of Wisconsin, says: "Palestine, a land once 'flowing with milk and honey,' so full of native products as to attract the children of Israel from the highly favored plains of Egypt; a country which for many ages sustained a numerous, happy, and prosperous people, is now comparatively a barren waste; its productions scarcely sufficient for a miserable population, dwindled to only one-tenth of its former numbers. The most careful examination of the soil shows no want of the elements of vegetable growth—it remains as fertile to-day as in the most ancient times, thus showing that we must look to the changes in the local condition of the climate, rather than the exhaustion of the soil for the causes of the wonderful changes that have taken place; and these local climatic changes could only be produced by the indiscriminate destruction of the forests that originally covered the whole country."

Egypt from time immemorial has been spoken of as a rainless region, depending upon the inundations of the Nile to fructify its plains; even in the Delta did rain fall only five or six days in the year. Several years ago MOHAMMET ALI, Viceroy of Egypt, planted twenty millions of palm, mulberry, olive, orange, and other trees on the Delta, and they have now attained a large size; and the result is, that the number of rainy days has gradually increased from five or six every year to forty, with a prospect of a still greater augmentation.

The *British Medical Journal* says the ground on which stands Ismailia, a healthful and flourishing Egyptian town of six thousand inhabitants, was but a few years since a dry, sandy desert, almost uninhabitable. Until four years ago rain was unknown, but in twelve months ending in April, there were actually fourteen days on which rain fell, and lately there fell a tremendous shower of rain—a phenomenon which the oldest Arab had never previously witnessed. Rain ceases to fall on a country deprived of its forests, or only falls in violent

storms. Here we see rain returning to the desert on restoring its trees.

The Cape de Verde Islands, so named from their greenness, have been stripped of their forests by their improvident inhabitants, since which time they suffer terribly from periodical droughts, sometimes no rain falling for three years at a time, and thirty thousand inhabitants, or one-third of the population, have perished. Thus famine cuts down the inhabitants as pitilessly as they cut down the protecting trees. It has been proposed to replant the forests, yet such is the ignorance and indolence of the inhabitants that little has been done towards restoration, and it is probable that the entire race may be cut off, to be replaced by those who have learned that the "tree of the field is man's life."

The Canary Isles, when first discovered, were clothed with thick forests, a great part of which were destroyed by the first settlers, and the result has been the lessening of the rains, and the dwindling away of the springs and brooks. The aridity of the interior of Spain is owing to the hatred of the Spaniards to trees. The maritime regions of Algeria are remarkably dry, owing to the native husbandmen cutting down all the arborescent productions.

The clearing away of forests from any country will increase the dryness of the ground, and diminish the flow of water from springs and streams. HUMBOLDT, alluding to this result, says: "In felling the trees which covered the crowns and slopes of the mountains, men in all climates seem to be bringing upon future generations, two calamities at once—a want of fuel, and a scarcity of water." HERCHEL enumerates among the influences unfavorable to rain, "absence of vegetation in warm climates, and especially of trees. This is, no doubt, one of the reasons of the extreme aridity of Spain." "In my judgment," says BOUSSINGAULT, "it is settled that very large clearings must diminish the annual fall of rain in a country." "It is the experience of ages," says the *Journal of Science*, "in various countries, that the presence of forests really makes the climate comparatively wet, and their removal makes it dry." Clouds are attracted by many millions of leaf points, and will follow this attraction unless overpowered by strong air currents; hence, a distribution of forests must generally produce a distribution of rain.

The researches of modern science and all accurate and careful observation, as well as the history of the past, show that a country abound-

ing in forests is more moist, has a more copious and equable rain-fall, abounds more in springs and streams; and, as a consequence of all these, is more exempt from great and sudden fluctuations in temperature, from late frosts in Spring and early frosts in the Fall. The controlling influence of forests over rain-falls is also shown by the fact that countries once supplied with forests, and having abundant rains and immunity from frost, their forests having been destroyed, have been scourged by drought and frost till the forests were restored, when they once more became fruitful; or, if the inhabitants would not restore their protecting forests, the stern hand of famine threatened to wipe out a race that would not reverence the order of nature.

Its Effect in America.—"It is certain," observes Hon. E. P. MARRI, "that a desolation like that which has overwhelmed many of the once beautiful and fertile regions of Europe, awaits an important part of the territory of the United States, unless prompt measures shall be taken to check the action of the destructive causes already in operation." He adds that it is in vain to expect that legislation in our country can do anything effectual to arrest the progress of the evil, as there is little respect here for public property. Government has proved itself unable to protect the live-oak woods of Florida, intended to be preserved for the use of the Navy, and has more than once paid contractors a high price for timber stolen from its own forests. "The only legal provisions," continues Mr. MARRI, "from which anything can be hoped are such as shall make it a matter of private advantage to the landholder to spare the trees upon his ground, and promote the growth of his young wood. Something may be done by exempting standing forests from taxation, and by imposing taxes on wood felled for fuel or timber; something by premiums or honorary distinctions for judicious management of the woods. It would be difficult to induce governments, general or local, to make the necessary appropriations for such purposes. But there can be no doubt that it would be sound economy in the end."

A few years since, the late Hon. STEPHEN A. DOUGLAS, in an address before the New York State Fair, said: "With all the incalculable advantages derivable from our extensive and superb primeval forests, and with our unbounded coal fields, the want of fire-wood is already felt in some districts, which, like the prairies of the West, are naturally destitute of

timber, or in which locomotives and steamboats are consuming the article faster than it can be reproduced in the ordinary course of nature. There is also reason to believe that the extreme desire of pressing civilization forward, and of fertilizing the wilderness in the shortest time, induces many a hardy pioneer of the West to enter somewhat enthusiastically on the 'extermination' of our woods, when considerations not merely poetical, but economical and practical, would, in more than one instance, cry out to him, 'Woodman, spare that tree!'

"Trees are not merely useful and ornamental, but also, by their mere existence—by the breathing of oxygen—eminently conducive to health. They are the companions of man as much so as some of the domestic animals, and have, as such, acquired a certain right to his protection. Many localities which I could name, especially near the sea-coast, have been completely shorn of timber; and experience has shown that a forest once entirely cut down will not grow up again and produce the same kinds of timber. Much inconvenience is now felt in consequence, and the evil is progressive, threatening the comfort and interests of farmers, mechanics, and all classes engaged in industrial pursuits.

"In most countries of Europe, the preservation of forests by only partially cutting down the timber, and selecting for that purpose only those trees, the removal of which facilitates the growth of the young trees, by which means the same species of timber can be reproduced almost *ad infinitum*, without any perceptible deterioration in quality, is reduced to a science, taught in academies and colleges. And though we may not in this country feel the necessity of husbanding our almost countless resources of the forest, yet more attention than has hitherto been paid to the subject, is certainly due to it."

The Hon. HORACE GREELEY, in a lecture before the Union Agricultural Society, of Brockport, New York, said: "This matter of raising timber needs to be better cared for. Taking the forest off has left our lands exposed to the bleak and driving winds, and has aggravated the disadvantages of our hot, dry Summers, and bleak, cold Winters. Lack of forests has narrowed the fruit region, and is constantly narrowing it. More forests must be raised, and those of the best kinds."

Remarked the late Rev. FREDERICK STARR, Jr., in an able paper in the United States Agricultural Report, for 1865, on American For-

ests, "We ought to learn from the experience of other nations great and terrible lessons, without madly insisting upon suffering the same disasters ourselves. The history of the world presents to us a fearful record respecting the destruction of the forests. Palestine and Syria, Egypt and Italy, France and Spain, have seen some of their most populous regions turned into forsaken wilderness, and their most fertile lands into arid, sandy deserts. The danger to our land is near at hand, NEARER, BY FULL THIRTY YEARS than the most intelligent suppose; we need immediate action both for prevention and restoration."

Value of Wood.—More than 50,000,000 acres throughout the whole country, were brought under cultivation during the decade between 1850 and 1860; counting two-fifths of which as timbered land, would give about 7,000 acres cleared of their timber each week day. Of this general consumption, it is estimated that the wood used for fuel alone, at the lowest figures, would be valued at \$75,000,000 annually; and the wooden fences of the country and their repairs, not less than \$150,000,000 more.

The wood consumed in one year by the New York Central Railroad amounts to over 160,000 cords—which at forty cords per acre, would require at least 4,000 acres of heavily timbered land to furnish this supply. At the same rate, all the railroads in the country would consume between 6,000,000 and 7,000,000 cords, which, at forty cords per acre, would require 160,000 acres, or 500 acres each day. The single item of repairing the timbers of existing railroads requires the expenditure of \$30,000,000 annually—to say nothing of the lumber used for fencing more than 60,000 miles of railroad lines. More than \$100,000,000 worth of sawed lumber is consumed yearly, while the addition of timber for building, for ships, cooperage, and various other purposes, will probably swell the aggregate to \$250,000,000; and the fact that the lumber taken to our Eastern cities, is conveyed, in some instances, a distance of 2,000 miles, shows the denuded condition of the country.

The wooden ships of the United States cost over \$200,000,000. Of the 3,262,000 dwelling houses in the United States, a large majority are built of wood; and of those made of brick or stone, about one-half the expense consists of the wooden floors, doors, frames, timbers, roofs, etc. The value of farms in the United States

in 1860, was between six and seven thousand million, and the value of lumber improvements at one-half this amount would be more than three thousand million.

PLANTING OF TIMBER.

J. J. THOMAS, in a valuable paper on the Woodland and Timber Crop, in TUCKER'S *Rural Affairs*, for 1866, says: "The want of economy in the waste of wood is much to be regretted. We do not ask land owners to keep their old woods untouched. It does not pay. The owner of a forty-acre wood lot refused, many years ago, an offer of forty dollars per acre; he sold it afterward for one hundred dollars per acre—but this increase in price did not pay the interest and taxes in the interim. It is not advisable, therefore, to keep a large amount of dead capital in the shape of the original forests. A brief estimate will show that this is far less profitable than to raise new timber, and cut it away at a suitable age. By counting the annual rings in our forest trees, we find them to average mostly from one to two hundred years old, and to yield about fifty cords per acre. Calling the average period one hundred and fifty years, three years are required to grow a cord of wood. On similar land, occupied with well-managed young timber, and cut once in about twenty years, an average amount of not less than two cords annually may be obtained—a product six times as great as to allow the trees a century and a half in growing. To cut only the old decaying trees out of the forest would yield a still less return. The best way, therefore, unquestionably, is not the assiduous preservation of our old woodlands, but a general and extensive planting of new timber."

It is an error to suppose that a farmer can not afford to set apart any considerable portion of his farm for the cultivation of timber. Most of our farmers are more or less exposed to heavy winds and storms, and the arid blasts of the Southwestern Summer currents, and need the benefits and protection of timber. "I say thoughtfully," writes HORACE GREELEY, "that an average farm of one hundred acres in the old States will produce more grass with twenty-five of its roughest acres covered with wood, than if the whole were denuded of trees, and seeded down to mowing and pasturage."

A few of the many ends to be gained by extensive planting of forest trees upon our denuded farms and prairies are:

1. *The Promotion of Health.*—It is a well-known fact in vegetable physiology, that poisonous gases are absorbed by the leaves, and thus converted from health-destroying into health-promoting elements.

2. *Shelter from violent winds*, and an absolute checking of their force to so great a degree as to preserve growing crops of cereals from destruction, and secure a large increase of fruit; also securing a more equal distribution of rain and snow over the surface of the ground.

3. *Furnishing a supply of timber* for fencing, building, fuel, and all mechanical purposes.

4. *Adorning our denuded lands and prairies*, and rendering our homes more attractive; in short, changing nude and monotonous lands into charming and varied landscapes.

The Profits of Tree Growing.—

In spontaneous growth, we have not a choice of the best timber—we have to take it as it comes, good and bad. "We must," says Mr. GREELEY, "plant choice timber, and not allow come-by-chance upstarts to monopolize our rugged lands. It seems to us most strange that our grandfathers planted orchards without grafting, and let them bear just such fruit as they might; but it is just as mad to grow forests of comparatively worthless trees, when we might have the best instead. An acre of well-grown locust or hickory must be worth at least \$200, where just as heavy a growth mainly of hemlock, beech, birch, and dogwood would hardly be worth \$75. Might we not as sensibly grow small, sour, miserable cider apples where we might have had greenings or pippins, if we had chosen, as to grow poor trees where a little labor in planting would have insured us good ones?"

Repeated experiments, says J. J. THOMAS, have shown, that on poor lands a product may be obtained from well-managed natural plantations, equivalent to one cord per acre annually, and, on good land, two cords yearly may be relied on. Judge WARNER stated at the meeting of the Western New York Horticultural Society, in January, 1869, that he has a soft maple ten years planted, which would make half a cord of wood. At this rate of growth—which is, perhaps, more than could be generally counted on—an acre of one hundred and sixty soft maples would yield an average of eight cords a year. Judge KNAPP asserts that for the purpose of growing wood, six hundred and forty trees, eight and a quarter feet apart, might be planted on an acre; or, at five and

a half feet apart, fourteen hundred and forty trees.

The period for clearing off the timber in these instances, varies from eighteen to twenty-five years. Artificial plantations set in rows with perfect regularity, and cultivated for a few years, at first would undoubtedly do quite as well, or better, while the advantage of selecting the kind of trees most valuable in market, would be an important one. Take, for example, the common locust, single posts of which sell in many places for one dollar each. Allowing the moderate estimate of one cord annually, and allowing fifty posts per cord, we should have a yearly result of fifty dollars for each acre, besides the tops. If they were worth only one-half this amount, it would afford a handsome interest on the cost of most of our country lands.

"Ten years ago," said Governor HOLBROOK, of Vermont, "I cut the wood off a long stretch of hill-sides, and, in my inexperience, burnt over a portion of it for pasturage. The remainder was left to grow up again to wood. Many of the young trees are six to eight inches through; they are all very straight and thrifty, and I value one acre of this land more than five acres of that which is in pasture. I shall not again permanently clear up my steep hill-sides."

A wood lot in central New York, cut over twenty years since, was suffered again to grow up to wood, contrary to the usual custom. It was recently sold at auction for \$3,400, while it would not have brought over \$800, had it been given exclusively to pasture from the time it was cleared.

Mr. THOMAS mentions another tract of land in central New York, which was cleared of an original growth of wood twenty-five years, and left to itself to produce another growth from the sprout. The land, with its present standing wood, was appraised, a year or two since, at fifty dollars an acre. Ten dollars an acre is all that similar land, in pasture, in that vicinity, has ever been worth. By the application of a little arithmetic then, we find that the increase of this second growth of wood has been equal to sixteen per cent. interest, per annum, on the worth of the land, without a dollar's expense for the cultivation—that is, ten dollars at sixteen per cent. simple interest, for twenty-five years, amounts to forty dollars; to which add the principal, the worth of the land, and we have fifty dollars, the appraised present value per acre.

An agriculturist of high position, authority, and ability, recently estimated the value of a hundred acres of good locust timber, if planted this year and well taken care of, and cut off twenty years hence, at \$100,000, or \$1,000 per acre; the estimate was based upon the measurement of medium locust trees twenty years old, growing on good cultivated land. The young trees were to be planted in rows, and the intermediate crops and early thinnings were computed to be equal to the expense of cultivating for the first few years. The present price of locust timber in Eastern cities, was taken, and the whole result reduced to one-half for contingencies.

Says E. G. GREGORY, in the *Iowa Homestead*, "Twelve years ago myself and neighbor bought five thousand soft maple trees a year old, and divided them equally, and set them on about three and a half acres. I set mine in rows about eight feet one way and six feet the other, being careful to get rows straight. I planted potatoes the first year, then corn two years, and at the end of the third year, my trees, then four years old, were ten or twelve feet high. I then sowed the piece to clover, and made a hog pasture of it, and it has remained so ever since, save some years I plowed and sowed it to early oats for hogs."

"Now for the result. When I offered my farm for sale, I reserved the grove, or asked an addition of \$1000 for it. If the farm sold without the timber, I was to clear the timber from it during the coming Winter. Several purchasers came, and most of them said I might remove my grove at those figures. At last came a careful old Quaker, from Butler county, Ohio, who, in place of telling me to take my grove, sat down, pencil in hand, to figure out the \$1000.

"I planted 2,542 trees twelve years ago, and we found 2,402 trees that would average eight inches through, and thirty feet in height. Now who says those trees are not worth sixty cents apiece, to cut down for rails and fire-wood, and worth a great deal more to leave standing for a few years? At sixty cents, the grove was worth \$1,441, and to the farm was worth \$500 more. The man took the grove at \$1000. Now what did the grove cost me? Merely nothing. The pasture, and crops, and the looks of it, more than paid for all the trouble."

Thirty years ago, a man in Massachusetts planted thirty acres with acorns, and the result is a fine oak forest, with trees from twelve to eighteen inches in diameter. A man in Illi-

nois planted locust-seed on forty-five acres, and twenty years after, the timber, for fence posts, was worth \$150 per acre. A man near Kenosha, Wisconsin, permitted a second growth of timber to succeed one cleared off, and twenty years after, it was worth at least from \$50 to \$75 per acre for the wood.

So rapid has been the growth of timber on the prairies of Illinois, that where some of the early settlers located, twenty-five years ago, without a tree around them, they can now cut and hew good building timber a foot square. GEORGE HUSMANN, of Missouri, has trees of the European larch, ten years old, measuring from six to nine inches in diameter, abundantly large for fence posts. Mr. BROOKING, of Macomb county, Michigan, planted a plat with locust seed, which, eight years after, presented a delightful grove, the largest tree of which, round, straight and handsome, measured *two feet and eleven and three fourth inches* in circumference. Ten years after planting a grove of cotton wood in Adair county, Iowa, the trees attained a height of thirty to forty feet, and one of them measured more than two feet in diameter, one foot above the ground.

We take the following extract from that excellent work, FULLER'S Forest Tree Culturist: "Now the young one or two years old plants, or even the nuts, may be put in rows four feet apart, and the plants one foot apart in the rows; this will give 10,890 to the acre. At this distance they should reach a size in five to eight years, according to the soil and the care they receive, when they should be thinned, by taking out every alternate tree; this should be done by cutting them off near the ground. We therefore take out 5,445 trees suitable for hoop-poles. Their value will of course depend upon the market, but we will say four cents each, or \$40 per 1000, which would be a low price in New York; this would give \$272 80, as the return for the acre's first crop. In three or four years they will need thinning again, and we take out as before, one, or 2,722; these will, of course, be much larger; and if they will reach ten feet, and are of good thickness, they will readily bring ten cents each, or \$272 20, for the second crop. In a few years more they will require thinning again, and each time, the trees being larger, will bring an increased price. But we are not by this means exhausting our stock; far from it, for those we cut off at first have been producing sprouts which have grown much more rapidly than the originals; and if a little care has been given

them so that they shall not grow so thickly as to be injured thereby, we can begin to cut small hoop-poles from the sprouts of first cuttings before we have cut our third or fourth thinnings of the first crop; consequently we have a perpetual crop which requires no cultivation after the first few years. As soon as the leaves become numerous enough to shade the ground, no weeds will grow among them, and the annual crop of leaves that fall will keep the soil rich and moist."

DAVID PETTIT, of New Jersey, gives the following estimate of profits in raising an acre of chestnut timber: "I will suppose the trees planted one rod apart each way, making one hundred and sixty trees to the acre, to cost at two years old in the nursery \$5 per hundred, or \$8 per acre; add to this \$2 for transplanting, and we have \$10 per acre. If planted out younger they will not succeed so well, and if kept longer in the nursery the risk of dying will increase with the time. The chestnuts should be kept damp as soon as ripe to insure success, as a very few days exposure to the dry air will prevent germination. If the land is fit for tillage, it can be planted with corn or some other cultivated crop, four feet one and one-half inches each way, and at every fourth hill each way, plant the young trees and cultivate with the crops, which will facilitate their growth, while the crops will pay; then leave them to natural causes for protection. When the land is too hilly or not fit for tillage, the trees can be set without the expense of cultivating. In about eight years after transplanting, the trees will become bushy and not fit for rails, and should be cut down to eight or ten inches from the ground. If they succeed well, they will send up at least five good suckers from each stump. These will grow rapidly, straight and tall, and will, in twenty-five years, or less, from planting make six good rails from each sucker, or 4,800 rails per acre, which at \$9 per hundred amounts to \$432, or \$16 a year clear of cost of planting. After this cutting, they will become more remunerative, as they will bear cutting every fifteen years, and produce more at each cutting, or at least \$26 a year, and this, too, without the expense of fencing, or farming, or cutting the timber, as the tops and branches of the trees will amply pay all expenses. If the above estimate is correct, where is there any farm land that will equal it in profit of farm crops for a series of years? If the estimate is considered too high, reduce it one-fourth or one-half, then add seed, labor,

manure, and the cost of fencing, to say nothing of the extra taxes on the improved land, and then we shall see which will pay best. Sixteen dollars a year is the interest of more than \$200 per acre, and \$26 for the second cutting, the interest on more than \$350, more than our best land will sell for near markets. I know of young chestnut trees where the timber was cut not twenty-three years ago that will make more than double the above estimate of rails and some will now make good building timber and fence posts.

State Aid.—So important is this matter of tree culture beginning to be regarded, that many able writers on agriculture in our country are urging its necessity and advantages, and Agricultural and Horticultural Societies, and State Legislatures are waking up to the importance of the subject by offering premiums and encouragements for the growth of forest trees. In 1864, the New York Agricultural Society offered a premium of \$200 for the best forest orchard of a given number of acres.

In 1867, General H. C. HOBART, of the Wisconsin Legislature, secured the passage of an act in relation to the growth of forest trees, and the appointment of three commissioners to report to that body on the disastrous results of the destruction of forests, the effect of trees on climate, and the best methods for their successful growth and culture. An able report was made, and the Legislature, as an incipient measure, provided that a farmer who plants a row of trees along the public highway shall be exempt from working on the road, and that whoever injures one such tree shall be subject to a fine of \$5. The State Horticultural Society, of Wisconsin, has offered a premium of \$100 for the best ten acres of forest trees of three year's growth, and \$50 for the second best.

The Legislature of Nebraska has passed a law exempting from taxation, for five years, \$100 worth of the real property of each taxpayer for each acre of forest trees he shall plant and cultivate, provided that the trees shall not be planted more than twelve feet apart and shall be kept in a healthy and growing condition; and an exemption of \$50 worth of real property for each acre so cultivated, whose distance shall not exceed thirty-three feet apart.

The Illinois Agricultural Society has for several years granted a premium for the largest number of trees planted or transplanted into an artificial grove, and several competing tracts have ranged from four to fifteen acres,

composed of maple, elm, butternut, elder, larch, beech, birch, dogwood, tulip or cotton wood, locust, and other varieties. On the prairies of Illinois the successful culture of timber is no longer a matter of uncertainty. The locust is less cultivated than formerly on account of its being so much infested by the borer of late years.

The Northern Illinois Horticultural Society recently adopted resolutions urging the Legislature of that State to pass a law for the encouragement of the planting of forest trees, either by remitting State taxes or by giving premiums for plantations of useful forest trees. The society also adopted the following list of timber trees for cultivation in northern Illinois:

For Groves.—European larch, black walnut, butternut, white pine, tulip tree, and white, red, and blue ash.

Nut-Bearing Trees.—Butternut, black walnut, shellbark hickory, and chestnut.

Shade and Ornamental Trees.—White elm, silver maple, white ash, mountain ash, tulip tree, honey maple, honey locust, rock elm, and cucumber tree.

Evergreens.—Norway spruce, white spruce, Austrian pine, white pine, red pine, balsam of fir, arbor vitae, and red cedar.

The Legislature of Kansas has offered large premiums for forest planting, and Iowa has taken steps in her councils to secure the same ends.

Cheap Trees.—Our first great need is the establishment and diffusion of extensive nurseries of cheap forest trees. Forest trees are raised in nurseries in England as fruit trees are here. The following prices are from a late English catalogue: Ash, birch, beech, alder, \$5 per 1,000; chestnut and elm, \$6; spruce, \$1 95; pine, \$2 45, etc. "I hear of gentlemen," says Mr. GREELEY, "importing ten thousand young trees from Europe at a net cost of less than one hundred dollars." Let the best varieties of forest trees be abundant and cheap, and it will prove a strong stimulant to the planting of many an acre of steep, bleak, stony hills, creek and road borders, and out-of-the-way places, with the finest trees for timber, profit, health, and beauty. Where no forest tree nurseries exist, the farmer must raise his own trees, from which he has the advantage of making the choicest selection, and of having them conveniently at hand to be transplanted at the right time, and in the freshest condition.

Such trees as poplar, cotton wood, white and

yellow willow, balm of gilead, and white mulberry, can be propagated by slips, covering the cut ends with hot resin mixed with a little tallow or linseed oil. All nuts, and indeed the seeds of elm, maple, locust, and other trees, do best when planted immediately after they ripen, as exposure and dryness very soon render them unfit for germination. If sown in a nursery, the ground should be well prepared, planted in rows, so as to allow the soil to be thoroughly worked. Nuts ripen in the Fall, and should be planted three or four inches deep; the seeds of the elm, red, or soft maple, and white, or silver-leaved maple, ripen from the twentieth of May to the fifteenth of June, those of the sugar maple, ash, linden, and locust not till Autumn, and should be covered with an inch of fine soil. The little shoots of elm and maple will grow one or two feet in height the first season, and the elm will even exceed that, under favorable circumstances. The young trees should be transplanted when one or two years old; if planted upon a steep side-hill, a trowel will be found most convenient in setting them.

Kinds of Trees to Plant.—A selection must be made with reference to the purposes for which they are designed—whether for fuel, posts, fencing, etc. The common locust is largely cultivated for posts; the chestnut, ash, and cedar for fencing; the hard maple for sugar; nut trees and mulberry for their fruits; and all these and others for shade and ornamental purposes, for screens and protective belts. Those varieties which grow the most rapidly, and split the most freely, are the cheapest to grow for posts, for if they do not naturally last well in the ground, they may be prepared by use of gas tar or by kyanizing, at an expense of some three cents each, so as to last from twenty to thirty years. Seasoned posts of the white willow will last from twelve to twenty years.

The most rapidly growing varieties are the linden or basswood, yellow and white willow, chestnut, white and ash-leaved maple, locust, tulip or cotton wood, and Lombardy poplar. These will grow from four to six feet in a season; and the white willow will, in ten years, be of sufficient size for fence posts, rails, and fuel; and, sprouting from the stump, a succession of crops naturally ensues without replanting. White and blue ash; red and white elm; white, yellow, and black birch; European and American larch; black walnuts and butternuts; ash-leaved, hard, or sugar maples, are all very de-

sirable trees for planting, both in screens and groves. The white or silver-leaved maple, a different tree from the red, soft, or swamp maple, is a rapid grower, does not throw up suckers, is useful for fuel, and very valuable for belts.

The European larch has the reputation of being second only to the renowned cedar of Lebanon for the durability of its timber—being regarded by all European writers as almost imperishable, either in or out of water. It is highly commended by GEORGE HUSMANN, of Missouri, D. C. SCOFIELD, in the *American Journal of Horticulture*, and ROBERT DOUGLAS, of Waukegan, Illinois, for its durable qualities, and as being a tolerably fast growing tree. The Osage orange in Texas sometimes attains a height of sixty feet, and makes superior posts and rails, as it is indestructible or very nearly so; and when raised for timber, it should be planted at such distances as not to dwarf it. Evergreens, more suitable for belting than timber purposes, will be more appropriately noticed in connection with screens and tree belts.

Tree Culture.—Planting.—If steep hill-sides are to be planted, the spade and trowel are the most fitting tools with which to do the work. On ground more level, plow very deep—Fall plowing is the best—then plow furrows, four, six, or eight feet apart; when planted near together, the surface is soon shaded and mulched, and the progress of the young trees is then more rapid. In these furrows plant the trees when not more than three or four feet high; then they will be less affected by removal than at any subsequent period; and plant in the quincunx form, each tree at an equal distance from six others around it—in the second row, the trees to be planted so as to be midway between those of the opposite row, and so alternating. “In my opinion,” says Mr. GREELEY, “more trees can be grown per acre, and they can grow faster where different varieties are intermingled, than where the ground is wholly given up to oak, or pine, or locust, or hickory. By interspersing some of the rapidly-growing varieties, the latter will early attain a size for use, and can be thinned out in time to give the others a free chance for growth. If planted pretty closely together, then an occasional row should be planted sufficiently wide to admit the free passage of a wagon. By planting in rows, and cultivating the trees while young, they will grow many times as fast as they otherwise would; and potatoes and beans may be culti-

vated between the rows for the first two or three years, and then corn if the trees should not happen to shade all the ground. In transplanting, care should be taken to preserve the roots, and to reset the trees so that the roots and rootlets may have their natural position, descending slightly from the base of the trunk of the tree; and mulching would be desirable, if not planted with beans and potatoes.

Thinning.—This has already been casually noticed. The first thinning should be done when the trees are about large enough for hoop-poles; the more crooked and feeble trees should be cut out, leaving the best and straightest as nearly at uniform distances as may be practicable. Ordinarily, these thinnings, for hoop-poles and fuel, will fully pay the interest on the land. The trees left for growth should have their lower limbs trimmed off for some six feet from the ground, except the exterior of the woodlands, which should be left untouched to prevent winds sweeping through. These thinnings and trimmings should not be so severe as to let in much sunlight; for the shade and mulching of leaves protect the roots, preserve moisture, and serve greatly to push forward the young timber. As the size of the trees increase, other and successive thinnings will be necessary. Experiments have proved that forest orchards, side by side, of the same age, have when properly thinned and trimmed, proved thirty-three per cent. more in value than those left to grow up without such care, while the surplus wood thus removed more than pays for the labor.

When the locust, the willow, and other of the fast growing varieties attain a sufficient size for posts, they may be cut in the Spring for that purpose, when a second growth will spring from the stump in less than half the time taken by the first—so that this second growth will make respectable posts in five or six years, at which period it may be cut at a season when the roots will die, leaving the ground to the other trees. As a rule, deciduous trees cut late in Winter or in the Spring, will start again from the root and grow luxuriantly; while the same trees, if cut in August or September, will seldom start again. These facts afford a hint to whomsoever would kill part of his timber, and keep the residue constantly reproducing its kind.

In removing trees, let a view be had to the protection of the remaining forest, taking those decaying and liable to fall, and those that have

become insecure and are liable to be uprooted by violent storms. And care should be exercised in felling trees, not only to facilitate the removal of the logs and wood, but also to save the breakage of the remaining trees. And by all means exclude domestic animals from the woods, if you would obtain the best results. Let the trees of the least value be cut out for wood, and thin out the poorest of the trees where they stand too thickly. Take away large, branching, and indifferent trees where the woods are sparse, and set young trees and plant nuts of valuable varieties in the area thus opened.

Relative Growth of Trees.—Did we accurately know the relative growth of trees, and their respective values for fuel and timber purposes, it would be of incalculable benefit, and would better enable farmers to determine the best and most profitable kinds for culture. We have some data by which we may form approximate estimates, particularly of growth.

In a report of a committee of the Illinois Horticultural Society, in 1864, the following results were given as about the average growth in that State in twelve years, of the leading desirable varieties, when planted in belts or groves, and properly cultivated:

White willow, eighteen inches in diameter, and forty feet high.

Yellow willow, eighteen inches in diameter, and thirty-five feet high.

White maple, twelve inches in diameter, and thirty feet high.

Ash-leaved maple, twelve inches in diameter, and twenty feet high.

Lombardy poplar, ten inches in diameter, and forty feet high.

Birch, varieties, ten inches in diameter, and twenty-five feet high.

Blue and white ash, ten inches in diameter, and twenty feet high.

Black walnut and butternut, ten inches in diameter, and twenty feet high.

Chestnut, ten inches in diameter, and twenty feet high.

Elm, ten inches in diameter, and twenty feet high.

Hickory and larch, eight inches in diameter, and twenty-five feet high.

Evergreens make an average growth of eighteen to twenty inches in height annually.

R. S. FAY, of Massachusetts, gave a statement in the *Country Gentleman*, in 1862, of measurements he had made of trees he had grown, which were set out when mostly about

three feet high, fourteen or fifteen years before, measured four feet from the ground, and never had any cultivation:

White maples, thirteen to fifteen inches.

Spanish chestnut, eleven inches.

Elm, from seed, ten inches.

Pine oak, ten inches.

Sycamore or Norway maples, eight to eleven inches.

White pine, nine to ten inches.

Canoe birch, nine inches.

Scotch larch and Norway spruce, eight to ten inches.

Austrian pine and Scotch fir, eight to nine inches.

Rock maples, seven to nine inches.

Over-cup white oak, seven inches.

White oak, six inches.

T. J. THOMAS adds, that he has measured sugar maples in Cayuga county, New York, planted by the roadside, eighteen years after planting, and which had received no care, and they averaged a foot in diameter, and thirty feet high; and the Scotch larch, eight years after planting, seven inches in diameter, and over twenty feet high.

The estimates, made with great care, and submitted to the Illinois Horticultural Society, show that fence posts, from the soft-wooded and rapid-growing trees, may be grown at a cost of about two or three cents each; lumber \$6 to \$7 per thousand; fire-wood, \$1 50 per cord. Black walnut and butternut posts, about four cents each; ash lumber, one of the most useful varieties for mechanical purposes, about \$10 per thousand; and black walnut, the mahogany of the West, about the same.

Shade Trees for Cities.—Sugar maple and silver maple do not flourish in the dust of a city; and the cotton wood is too badly infested with worms to render it desirable. The Lombardy poplar has an effective, stately show, among other trees, but is attacked by the leaf folder and other insects. The silver-leaved poplar bears dust well, and is a fine tree for school grounds. The white elm is a noble tree, and the ash-leaved maple, a rapid grower, is very desirable to alternate with it, growing thirty feet high, and adding much to the effect, but in time would have to give place to the more gigantic proportions of the elm. The white and green ash, horse chestnut, and larch make fine shades.

The late Dr. DANIEL DRAKE recommended that shade trees should be cultivated in our

towns and cities more extensively than they now are; but those which grow to a great height should not be chosen, because they render the walls and the roofs of the houses damp. The object is, to shade the sidewalks. Very broad streets or avenues should have rows of larger trees in their centers; for, at such a distance, they do not produce the injury just mentioned, while they keep down the heat of the surface, diminish radiation, and protect passengers.

The towns of the South are generally well shaded, either with sheds and awnings, or with trees. The *Pride of China* is the favorite up to latitude 33°, above which it does not bear the colder Winters. Then the resort is to the white-flowering locust, with which, in higher latitudes, is blended the water maple, white elm, catalpa, and sycamore, all of which grow too large for narrow streets. But, within a few years, the *ailanthus*, a foreign tree, has been introduced, and become a general favorite.

New Haven, Connecticut, "the City of Elms," owes its reputation, as the most attractive city in the United States, to the majestic elms which border every street, and crown some of the central thoroughfares with a perfect unbroken Gothic arch. JAMES HILLHOUSE planted them for posterity, and his memory lives in their bower of summer green—the poet's chosen monument.

Plant More Trees.—In all the mountain ranges, on hill-sides, along the borders of lakes and streams, in swamps, surrounding every farm, in every village, around every rural cottage, school house, and church, on the sides of every highway, and railroad, in every cemetery, and on public parks, the growth of forest trees should be promoted by their protection, and multiplied by planting, where they do not spontaneously spring up.

"Jock," said the dying Laird of Dumbiedikes to his son and heir, "when ye hae naething else to do, ye may be aye sticking in a tree; it will be growing, Jock, when ye're sleeping." This advice is worthy the attention of the farmers of the country. In many parts of our land, the supply of timber, never large, is rapidly diminishing. The *London Times* is sounding Great Britain's alarm: "In three generations—that is, in the days of our children's children—all the coal of these islands, that lies within four thousand feet of the surface, will, we are told, be exhausted, if we go on increasing our consumption at the present rate." The same danger threatens our country. Wood for

fuel commands a price oppressive to the poor, and burdensome to all; while it is becoming scarce for fencing, for railroad construction and supply, for building and manufacturing purposes. The absence of timber affects the climate, health and products of our country, tending to render the Winters bleak, and the Summers fierce and arid. Then plant trees; they will bring wealth, and what is better, they will bring health and comfort also.

TREE BELTS FOR FARM PROTECTION.

Tree belts, or wood belts, are belts of trees, generally forest trees, so arranged on the farm as to furnish protection from the prevailing winds—coming from one source in Winter to freeze, and from another in the Summer to burn and blight. These belts, properly grown and located, are beneficial in various ways—in the vicinity of the farm-house, they sometimes cut off the misama arising from low lands; they furnish shelter for cattle when skirting pastures; they increase the average rain-fall, as has been seen; they produce fuel and timber, and they modify the severity of the weather, protecting field crops and fruit trees.

Effect on Health.—Aside from their beauty, merely hygienic considerations suggest that trees, planted at a little distance from the house, prove, not only a great comfort, but a real benefit. Miasma is not supposed to pass a swift-running stream in great quantities. But if there be a sluggish stream, or a pond or flat land on the farm, and the house must be built in the vicinity, it is better to build so that the prevailing winds from June to October shall blow from the house to the flat. It is better, also, if there can be a grove or belt of trees intervening, because miasmatic gas, like clouds, will sometimes roll up the side of a hill or mountain. Such a tree belt, or even bushes, hedges, or sunflowers, between a miasm-producing locality and a dwelling, antagonize the miasmatic influences, the living leaves seeming to absorb and feed upon the poison; but there should be a space of fifty yards at least between the trees and the house, and the thicker and broader and higher the belt, and the nearer the ground the leaves the better; for the miasm gropes on and near the surface in its greatest malignity. Dr. BENJAMIN RUSH assigned as one of the causes of the unusually sickly character of Philadelphia, for many years after 1778, to the cutting

down by the British army of the trees which formerly sheltered the city from the malarious exhalations from the overflowed meadows on the south. Dr. RUSH refers to the fact of residences in the South becoming untenable from like causes—the cutting down of groves near dwellings.

Trees purify the air by absorbing the carbonic acid gas, which, when existing in sufficient quantity, is destructive to animal life, and by emitting, at least during sunshine, oxygen gas.

Effect on the Soil, Atmosphere and Climate.—“Forests,” says Professor A. WINCHELL, of Michigan, “are the garments of the soil. They protect it equally from excessive cold and from excessive heat. They shelter the snows from the drifting power of the wind, and are thus enabled to await the lapse of the rigorous Winter, with their feet wrapped in a fleecy blanket. Every Autumn they pay back to the soil, with interest, all that the soil has expended upon them. They fend off the burning rays of the Summer sun, and restrain the fervor of the atmosphere. They shield the soil from the evaporative influences, and maintain an equable degree of humidity. On sloping surfaces they bind together the soil, and resist the denudations of torrents.

“All these conditions and results are changed when the forest is removed. The sweeping blast of Winter strikes the earth with the fury of an invisible demon—drives off the natural covering of the soil, and exposes the roots and stems of vegetables to an unwanted and often insufferable trial. The circumstances of Spring time are changed. The soil feels every slight fluctuation of temperature—freezing by night and thawing by day—instead of reposing in peaceful shelter under its coat of snow till the unchanging season is able to guaranty a vegetable degree of warmth. And then, when Summer comes, the burning sun rapidly drinks up the moisture of the soil, and the whole air becomes torrid and dry. Instead of a regular humidity and gentle rains, the agency of man has substituted alternating thirst and floods. And, on hill-slopes where the natural ligatures of the soil have been removed, sudden torrents wash it away, and score the earth with ugly gorges and ravines.”

Our prairies are subject to the extremes of scorching heat in Summer and intense cold in Winter. But if one-tenth of the surface was covered with trees, the air currents would be changed, the temperature would become more

uniform, and we should no longer be subjected to those distressing extremes of heat and cold, drouths and storms, so painful to our senses, and so often fatal to life.

"Trees have a power," says Judge KNAPP, "to conduct heat, by which they facilitate its passage from the air to the ground in Summer, and from the ground to the air in Winter. Trees also, like animals, have a specific heat of their own, which aids in equalizing the temperature of the surrounding air. For some unexplained reason, connected with vegetable life, trees when in full foliage become cold at night, often colder than the air, which therefore is also cooled by this cause.

"Forests, by their shade, prevent the radiation of heat from the ground. The evaporation of a large amount of water from the surface of the leaves of trees produces coldness in the air in contact with them. It is quite evident, therefore, that a forest is a great equalizer of temperature, modifying both the extreme heat of Summer and the extreme cold in Winter; its removal makes the climate more excessive; the range of the thermometer being increased; and many crops, fruits, etc., that could be raised under the protection of the forests, are killed, either by this excessive heat or extreme cold."

The Wind Blasts of Summer and Winter.—"We all know," says Hon. M. L. DUNLAP, in the Illinois Horticultural Report of 1862, "that the prevailing wind is from the southwest, changing to the eastward before and during the great storms, and at their close, shifting to the northwest or to the southwest. A due north or south wind is but seldom experienced. Orchard and other trees are bent toward the northeast during the Summer growth, by the steady pressure of the southwest wind, which is almost constant in that direction during the season, for six months, commencing with April. A steady flow of wind from that direction has its origin thousands of miles away, and from the coast of Africa to the continent of South America, is known as the trade winds, from the fact that the current is constant in one direction, being along the equator to the west." This great air current veers to the north, passing along the base of the Rocky mountains, whose barriers it can not pass, with its immense volume heated by the glowing sun of the tropics, until it reaches Yucatan in its northward progress; thence it crosses into the Gulf of Mexico, forming the Gulf Stream; and while the eastern fork passes along up the At-

lantic and gives to western Europe its mild climate, the other portion is forced up the Mississippi Valley, extending its warm breath even as far as Hudson's bay.

A writer in northern Illinois, says: "I am situated on a high open prairie, about nine hundred feet above tide water, and about six miles from the woods or timber on the north, south, and east, while on the southwest and west is a prairie open to the Mississippi, one hundred miles distant. Our winds have free course, disturbed by no local influence, but truly go it with a rush. These winds from the southwest are often dry, and are sometimes so arid that in their sweep over the soil, vegetation is withered before them as if at the touch of fire."

In his report on the destruction of the forest trees of Wisconsin, Judge KNAPP remarks: "Nor is it alone a cold southwest wind which chills, freezes, congeals, and dries the sap of life out of vegetation, that is to be dreaded, but equally to be shunned is the same southwest wind, when, in another portion of the year, it becomes as fearfully dry and hot as the sirocco from the burning sands of Africa."

"Early in the Spring, say to the 1st of June," observes Mr. DUNLAP, "this southwest wind is cold and damp, and, when it sweeps over the surface, lessens the solar heat, and thus seriously retards the growth of vegetation. This dampness is imparted to it in part by the ocean, but the greater portion is due from the melting snow of the Rocky mountain range, which is gathered up and accumulated for thousands of miles along the plains at their base, and following down the valleys of the streams, meets and mingles with the trade winds, and passing the current to the east, gives us a southwest wind, divested of its warmth, but augmented in its force. But while the trade winds are constant in their flow, the winds from the north and west are variable; hence the changes that occur from the genial days when we have the trade winds coming direct from the south, at once cut short by an avalanche of the accumulations of damp and cold from the snowy range. Late in the Autumn the trade winds lose their force, and the northwest winds come to us with chilling frost, but fortunately in a dry condition, for at that season we have no melting snow to charge the air with dampness; and the result is, the air is clear, though cold. Under these conditions, we seldom have drizzling rain, or even snow, during the close of Autumn, while in the

Spring we have profuse floods of rain from the northwest."

Judge KNAPP, in a paper read before the Wisconsin Horticultural Society, in February, 1869, thus speaks of the effects of the winds coming from the Northern Ocean, as a surface current, through the Mississippi wind-gap: "All northern winds are sunken to the lowest points at this great antithermal axis, and are then gathered by the Alaska and anticlinal range of the Rocky mountains as they start for the Pacific Ocean, and by the high lands north of Lake Superior as they start for Wisconsin and Michigan, and altogether are deflected to the same point about the mouth of the Crow Wing, in Minnesota. Consequently there is crowded through this gap during Winter, less than one thousand miles wide, one-half of the whole northern polar current, when it moves on the surface, and that, too, the coldest wind in the Northern Hemisphere. From thence it is floated off in its normal course over the State of Wisconsin, and sends our thermometer down to 30° and 40° below zero, when by latitude it should never be less than eight degrees above. Thus Wisconsin, with the same latitudinal position as the four Northern New England States, has much hotter Summers and colder Winters than the corresponding latitudes of those States."

Tree Belts to Protect Crops.—These tempestuous winds, reaching sometimes the terrific proportions of tornadoes, produce immense damage to the growing crops and fruits of the country. Hence the need of shelter belts to ward off the effects of these blasts, as well as of these sudden changes to cold and damp. O. B. GALUSHA, in his recent lecture at the Industrial University of Illinois, stated that in the year 1862, just previous to the wheat and oat harvest, thirty counties in the northern portion of Illinois were visited by a severe storm from the northwest, which in its destructive sweep prostrated nearly all the grain not sheltered by timber. In one instance, a field of grain, lying east of a line of white willows, stood proudly erect, and was harvested with the reaper, while all beyond this protecting influence was completely prostrated. Nearly all these crops throughout that region were hooked up by the slow and laborious process of mowing, and did not yield more than half a crop, while much was left ungathered, and consumed by the fire. The total loss of grain in that region, as the result of that single storm, was estimated, at the lowest figures, at five million four hundred

and sixty thousand dollars. This entire loss might have been prevented by proper belts of trees, and the loss sustained by that single storm would have paid the expense of a belt of timber upon the west line of every cultivated eighty-acre lot.

A committee of the Michigan Legislature of 1866, reported to that body on the subject of forest trees, stating that, the previous year the loss on all that part of the State lying south of the Michigan Central Railroad—a region deprived of the ameliorating influences of Lake Michigan upon the southwest side—and comprising the richest agricultural portion of the State, was estimated at no less than three-fourths of the entire wheat crop! From what inquiries they had been able to make, the loss on the wheat crops alone, of that State, for the last four years, was not less than twenty millions of dollars. They say that they would be most happy to believe that this enormous loss springs from causes evanescent in their nature, and destined speedily to pass away, to return nevermore. But they feared that these vast losses are but "the beginning of sorrow," and that the improvidence which laid open their fields to that scourge of God, the southwest wind, by the wholesale destruction of their forests, is now only beginning to reap the fruit of that want of forethought; and that these losses can be avoided only by restoring in part, at least, the natural barriers against the wind.

Says General J. T. WORTHINGTON, of Chillicothe, Ohio, in the report of the Pomological Society of that State, for 1864: "I become every year more convinced of the necessity of belts of trees in our climate of extremes to protect the annual crops from the late frosts, and the fervid suns of July, August, and September; and I verily believe that if one-third of the land was devoted to belts of fruit and other valuable trees, the remaining two-thirds would produce as much as the whole without such shelter, even in average years, and far more in extreme ones; but I fear it is too early to preach planting trees to a generation which considers it 'the chief end of man' to destroy them."

Tree Belts for Orchard Protection.—The scathing effects of the severe and sirocco-like southwest winds of Summer, in the great valleys of the Mississippi and Ohio, and the terrible northwest blasts of Winter, are seen and felt throughout that widely extended region. Orchards in and about groves, produce annually very good crops, while those without such protection

seldom perfect more than half a crop, and often none at all. This results, according to the report of the Illinois Horticultural Society of 1864, partly from the blossoms and fruit being wrenched from the trees by the fierce winds, and partly from the fact that a given degree of cold proves much more disastrous to fruit buds or blossoms when accompanied by wind than when the air is still. The trees, themselves, are the greatest sufferers. They first become partially bent over by the strong southwest winds, so that the rays of the sun from one to three o'clock fall almost vertically upon their naked trunks, which vitiates the sap upon that side, producing a strip of dead wood. This invites the borer and the aphides or lice, the trees become permanently diseased and hasten to premature decay. The increase of our fruit crops alone would amply repay the cost of their protection by screens or belts.

When the settlements were new, and belts of woodland laced the entire country, peaches flourished in Massachusetts. Says Dr. R. C. KEDZIE, of the Agricultural College, Lansing: "The meteorological changes wrought by the destruction of the forests in Michigan are well marked. From 1828 to 1841 the peach crop in Lenawee county was as reliable as any fruit crop. The trees needed no protection and received but little care, and usually bore an enormous crop, followed by two years of smaller product, thus being abundant every third year. Now, in 1865, this fruit is only raised in situations protected in some manner from southwest winds, and the experience for fourteen years has been the same as at present. In 1852, and prior thereto, peaches were grown in Eaton county, near the center of Michigan, in abundance, however exposed; at present they are a rarity, except in guarded places. Thirty years ago a frost that would injure the corn in the Spring, or during the usual growing months, from May to October, was almost unknown; at present it is an element entering into the calculations of every prudent farmer, so frequently do such frosts occur. The aspects of the district above referred to have been changed by the woodman's ax, and with the last forest clearing the peach has failed, until at present no reliance can be placed upon it except near Lake Michigan."

A writer in an Ohio paper states, that twenty years ago in the southern portion of that State, as many as forty bushels of apples were frequently gathered from a single tree; that there were then swamps and ponds near, and the

country had been but slightly cleared, and there were dense fogs and heavy dews; but as the country became cleared up, swamps and ponds drained, fogs and dews rare and droughts frequent, apple trees sickened, fruit dropped off prematurely, and the trees lingered awhile and finally died, apparently from the influence of climatic changes.

Fruit trees planted in timbered land will come into bearing much sooner than those planted on prairie land, and there are good reasons for it. J. J. THOMAS, in his report on Timber Screens, made in 1868, to the Western New York Horticultural Society, says: "The rapid disappearance of the original forests has opened most of the country to the sweeping blasts and violence of the winds, and both fruit trees and farm crops are suffering from their effects. Young and newly planted orchards are severely frozen, whipped about, dried up and destroyed, in some instances, by the force of the blasts which for several Winter months sweep over them." "Screens," says T. G. YEOMANS, a practical farmer of western New York, "are of great value in growing all kinds of fruit trees and plants."

A. G. TUTTLE read before the Wisconsin Horticultural Society, in 1868, an able prize essay on the causes of injury and means of protection of orchards in the Northwest, in which he spoke of the injury to bearing orchards from severe and long protracted cold; called attention to the fact that extreme heat and extreme cold act in a similar manner upon plants and trees, and that exhaustive evaporation is equally injurious, whether produced by one or the other of these extremes. An examination of the branch of a tree while the mercury ranges from twenty to thirty degrees below zero, shows the wood to be reduced to the smallest compass possible—a shrinkage—not less than would take place if the branch was severed from the tree and exposed to a week of Summer heat. This condition, long continued, especially if the cold be accompanied by rapidly-moving currents of air, effectually drives off all moisture from the tree, and so compacts the wood that the tree is wholly or partially destroyed. That injury does not result to all trees alike, is very evident; for while one may be constitutionally fitted to endure severe freezing, another is destroyed by comparatively slight cold. The greatest injuries to our orchards have always been produced by a Winter of severest cold.

"What would I advise," continues Mr. TUT-

TLÉ, "to mitigate the effects of excessive cold? I answer, *protection*. I am well aware that in advocating shelter and protection for orchards, I am opposing the often-expressed opinions of some, that we should plant where they are exposed to the winds from the cold quarter.

"The necessity for protection has been recognized and repeatedly urged as an important auxiliary, in the growth of fruit, not only in this country, but throughout Europe, where the climate is milder, and less subject to extremes of heat and cold. Never before have the advantages and the necessity of protection been called into question. In the Middle and Eastern States, it is said to be much more difficult to grow fruit now than formerly, and the chief reason assigned for this change is, the destruction of forests, which once gave protection to their orchards.

"It is very singular that here, where the necessity for protection is far greater than at the East, from the fact that we are subject to greater extremes of heat and cold, and an almost unlimited sweep of the winds, a practice so entirely at variance with all former experience, should have found advocates. Unless we deny that the dry winds of Summer, or the cutting blasts of Winter result in injury, it is difficult to see how such a theory could find supporters. If a certain degree of cold will produce injury, its liability to injury will be increased if the cold is accompanied by a strong wind. The object of shelter is to arrest the drying currents, and modify the debilitating effects of injurious evaporation, whether produced by heat or cold. If it is true that protection is unnecessary, then our large open prairies are just the place for fruit growing, and the heavily-timbered portions of our State are unfit for that purpose. Does not all experience teach us to the contrary? We need shelter from the hot, drying winds of Summer, frequently, while the trees are in bloom, or at the time the fruit is setting. A strong wind, dry and hot, from the southwest, sweeps over them, causing excessive evaporation at a time when the tree is heavily taxed to support its blooming and the forth-coming foliage. The result is, a partial or total destruction of the crops. The injury to the crop from this cause is much more frequent than from late Spring frosts.

"*Protection on the northwest and west against the severe cold, and on the southwest to shield from the drying winds of Spring and Summer, is absolutely necessary.*"

Mr. TUTTLE said, at a subsequent meeting of the Wisconsin Horticultural Society, that he found that there were great differences between the fruits growing on timber lands and those on open prairie, and he had noticed several degrees in the difference of temperature, depending on the location, whether rolling or level, protected by trees or unprotected.

Says Mr. THOMAS: "ISAAC PULLEN, a well-known nurseryman at Hightstown, New York, showed me last Summer (1864) several belts of evergreens which had sprung up from his nursery rows to a height of twenty-five or thirty feet in ten years, and he stated that within the shelter of these screens his nursery trees, as well as farm crops, averaged fifty per cent more than on bleak and exposed places."

Judge J. G. KNAPP, in his exhaustive Report on Forest Trees to the Legislature of Wisconsin, in 1867, says: "Timber protection is absolutely necessary for the successful cultivation of certain crops and fruit trees." He cites a terrible hot, dry wind, almost sirocco-like, that swept over a considerable portion of southern Wisconsin and northern Illinois, on the 14th and 15th of June, 1861, when fruit trees, especially the more tender and valuable kinds, were injured, the leaves, and even young twigs being blasted and killed, and the fruit torn from the stems, and the injury to fruit and ornamental trees was much augmented by the mechanical effect of the violent wind, switching about the branches and leaves. Judge KNAPP states that orchards and crops protected by a sufficient belt of trees on the south and southwest side were found to be uninjured; and the damage resulting from this one storm was, doubtless, equal to the cost of such protection around a very great number of farms.

Best Trees for Belts.—With the single view of an effective protection, evergreens are confessedly the best. Retaining their foliage throughout the year, they form the most perfect screens. Deciduous trees may be planted so thickly as, in a measure, to give this protection, yet one row of thickly-planted evergreens, with their branches starting from the very base of their trunks, will do it more effectively than three rows of deciduous trees, occupying three times the quantity of land. Norway spruce, red cedar, American arbutus, white, Scotch, and American pines, make an average growth of about twenty inches—in some instances, the white pine has made a growth of four feet in a single season.

Other evergreen varieties are hardy, and may be planted with profit, such as balsam fir, our native spruces, yellow and gray pines. The balsam especially grows rapidly, and has the darkest, richest foliage of any of the varieties named, retaining its color through Winter; but as it is liable to lose its lower branches after the tree has attained a height of about forty feet, it should not be planted alone; interspersing with spruces would impart a pleasing effect. One writer asserts that the hemlock, despised as it has been, is preferable to other evergreens for belting purposes, from the fact that its branches are shorter, more compact, and will bear shortening in better. It seldom attains so large a growth in open fields as other evergreens, but is amply large for an effective tree belt. An advantage in resinous trees is, that they exude a fragrant resinous odor, healthful to man, but disagreeable to most insects.

It may be added, as an objection to evergreens, that cattle are apt to browse them considerably in Winter, unless kept in the stable, where they ought to be; and, as a recommendation of them, that they injure the ground less than deciduous trees.

Experience with Evergreen Screens.—SAMUEL EDWARDS, President of the Northern Illinois Horticultural Society, wrote in January, 1869: "My first evergreens for orchard screens were set some twelve or fifteen years since, and were white pine which answer well. The first Norway spruce screen for this purpose was set in the Spring of 1860; a double row, ten feet apart, and the same distance in the row, alternating, trees in one row opposite the space in the other. They are planted on all sides of the orchard, and fifteen rods apart; the rows running north and south. A single row is set in the place of a row of fruit trees.

A pear orchard of near five hundred trees has smaller squares, divided off by evergreens. They appear to endure our Winters much better when thus protected. Scarce any apples are now planted here, except such as endured the hard Winter of 1855-'56; but I am beginning to set some of the best varieties which were injured then, and am confident, with the shelter, and working in limbs on hardy stocks, they will succeed. Apple and pear trees among evergreens, have here borne full crops, when others standing near, without protection, had most of their blossoms destroyed by Spring frost. Many of our farmers are buying evergreens of small size by the thousand, and

growing them for screens. Whenever they are generally planted, we will see their full benefit, in a marked amelioration of severity of our Winters.

ELIJAH WEEKS, near Fryeburg, New Hampshire, one of the coldest places in the country, says he preserved some dwarf pears during a severe winter by simply placing some spruce trees, with their thick, low limbs, in holes dug on three sides of the pear trees and binding the tops together. Commenting on this fact, an agricultural editor remarks: For tender trees, especially the pear and plum in a cold climate like the above, it is well to set a thick double row or belt of evergreens upon the windward sides. Often a forest can be so cleared up as to leave a belt of trees, open, at most, on the south side. Trees planted in such an enclosure will be much less liable to freeze out than if fully exposed to the fierce blasts of Winter. Such winds are much modified and softened by being sifted through a forest or belt of evergreens. Spruce or hemlock boughs, bound around the branches of young trees, as above described, are the best means of protecting them for the time being, but as they increase in size, it is more difficult to cover them.

Heretofore, says the *Horticulturist*, planting evergreens among orchards of fruit trees has been deemed incongruous, and undeserving the attention of planters, or as presenting a careless waste of land without system, or order, in arrangement. From some observations we have made this season, however, and from records of several of our correspondents, we predict that it will be but a few years before we shall find many orchards interspersed irregularly with evergreen trees. Closer planting than heretofore recommended, we have no doubt, will prevail, as our fruit growers study the devastating effects of too great exposure of the young trees to wind and sun. In most sections this year, while fruit bloomed and set abundantly, gradually, little by little, it has dropped, until many a grower, who in early Summer counted on bushels, can now count fruit only by the dozens. We have watched this falling of the fruit pretty carefully, and while we have no doubt that too great an amount of bloom impaired the vitality and was the first cause of failure, yet observation has taught us that trees partially shaded and screened by evergreens, or by close planting with other trees, have retained their fruit, as a rule, better than those more exposed to the full rays of the sun, at all points, and the withering

blasts of wind, no matter from what quarter. Horticulturists at the West have for some time advocated hedge screens as a protection to their orchards, and we have no desire to undervalue them, while at the same time we would, in planting an orchard of five hundred trees, make one-fifth the number evergreens.

At the time the orchard is set, says a northern Iowa farmer, a screen should be planted on the north and west sides. A row of Scotch pine set six feet apart, or a row of Norway spruce set four feet apart, will make a beautiful and effective screen by the time the trees come into bearing, if given good cultivation; and young trees can be bought by the thousand very cheap. A good and cheaper screen can be made by planting two or three rows of the acorns of the common black or scrub-oak, which retains its leaves all Winter, and with good cultivation will grow quite rapidly.

We may cite a very successful orchard in central Wisconsin, located in Devil Lake Valley—a noted lake of very deep water, without apparent outlet, surrounded and protected by the Baraboo bluffs, some two or three hundred feet, and the lake and its valley are situated at a very considerable elevation above the Baraboo and Wisconsin valleys. The success in this instance arose from the complete and close protection of the orchard.

Elevated localities are really colder than their latitude would indicate. Every three hundred feet elevation, observes Judge KNAPP, is equal to an additional degree, which, for instance, would place Madison, Wisconsin, at one thousand feet above the level of the sea, more than three degrees, in effect, farther north than it really is, both as to heated atmosphere in Summer and cold in Winter. To this rule, however, there are exceptions and modifications. These elevated regions need tree belts to protect their fruit trees, grapes, and all exposed perennials from the severe colds to which they are exposed in Winter. To surround an orchard with hedges of evergreen, says another, is to make a climate equal to one or two hundred miles farther south.

Propagation of Evergreens.—Evergreens are regarded as difficult to raise from the seed, and some of them seem to require shade to insure their success. The smallest evergreen-seeds should not be planted more than the fourth of an inch deep, and this is performed by sifting fine mold over them to this depth. The larger pine-seeds may be placed say half an inch to an inch deep. Cultivation and mulching are

necessary. Nurserymen who study their appropriate soils and habitats, best succeed in supplying the market.

The ground should be prepared by trench plowing or subsoiling in the Autumn, or deep and thorough plowing in the Spring. Early Spring is the best time for planting all varieties of evergreens, though they may be removed with little loss at any time during the the Spring and Summer months. If in the latter, a damp cloudy day should be selected for the work. From one to three feet high is a very good size. In removing evergreens pains should be taken to preserve as many^a of the roots as possible, without mutilating them or splitting them at the collar. The roots should be dipped in mud, previously prepared, as soon as taken from the ground, and packed with damp straw or moss about them, being careful to prevent their exposure to the sun or dry air, for if the small roots are once allowed to get dry, the trees can not be relied upon to survive—even fifteen minutes' exposure in a dry atmosphere would prove fatal to very many trees. In planting, pains should be taken to have a mellow bed for the roots, which should be spread out with the extremities lower than the collar, filling all the interstices with fine earth. Press the dirt moderately upon the roots, and cultivate thoroughly with the plow for the first four years; after which a thorough mulching of straw, once in two years, will be sufficient. Treated in this manner, not one tree in forty will die.

Norway spruce is a perfectly hardy tree, costs about twenty dollars per hundred, and should be set twelve or fifteen feet apart each way. Pines should not be set closer than sixteen feet; or in rows ten feet apart, with the trees ten feet apart in the rows, so when sufficiently large to interfere, to cut out each alternate tree. Red cedar and arbor vitæ which cost about ten dollars per hundred, and other evergreens, may be planted more closely. A single row of Norway spruce, or White pine, planted five to ten feet apart, and well cared for, will soon furnish a barrier that will protect crops and fruits very much; but two rows, ten or twelve feet asunder, will do it more perfectly.

Deciduous Belts.—In treating of timber culture, the proper mode of raising deciduous trees, and the most suitable kinds for timber belts, were sufficiently considered. It is the opinion of some, that a heavier growth may be obtained from a given extent of land by intermingling different kinds, each of which may

draw different ingredients from the soil, or extend their roots into the earth at different depths. "The ash," says C. W. JOHNSON, "and more particularly the locust, are very obnoxious to most trees. Then, again, the grouping together of certain trees are particularly grateful to them all. Thus, the larch is a very good neighbor; the Scotch fir, the birch, and the Spanish chestnut grow very luxuriantly with it; the oak, the elm, the hazel, and the hornbeam are very good neighbors." Some recommend the planting, alternately, a row of evergreens and a row of deciduous trees. As a general rule, three rows form a good belt—and the deciduous trees generally eight to ten feet apart in the rows, the middle row being set so as to be opposite the center of the space between the others. Where land is plenty, and fuel and timber are had in view, four or five rows of deciduous trees, and two rows of evergreens to the west or north of them, would be desirable.

The timber belts, if sufficiently numerous, may be made to furnish the fuel and timber needful for home consumption, thus answering a double purpose. Nay, more, these very belts may be also made to contribute largely to the luxuries and comforts of the farmer's home. "If my eighty acres of woodland," says HORACE GREELEY, "were bare to-day, I would have a corner of it planted with sugar maple." Plant the sugar maple in the tree belt; on an acre of ground, or its equivalent in the belt, you may have, twenty or twenty-five years after planting, one hundred and sixty trees one foot in diameter, which will yield ten pounds of sugar each, or sixteen hundred pounds, worth at least fifteen cents per pound—\$250; or, deducting three-fourths for labor and expenses, leaving \$62 50. This would be its minimum annual yield for fifty years or more.

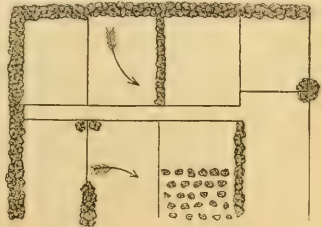
Or, plant the ash-leaved maple, a handsome tree, and valuable for protection, which has the merit of being a much more rapid grower than the sugar or hard maple—making an average growth of about four feet per year, forming a beautiful compact head, and is rich in saccharine matter, making an abundance of light-colored, well-grained sugar, almost identical in flavor with that made from the hard maple. From about ten gallons of the sap of the ash-leaved maple, two pounds of excellent sugar, and about half a pint of syrup, were produced. "The tree," says one, "is very hardy, and a rapid grower, and will do to tap at ten or twelve years old;" while another asserts, that

"it will be large enough to be tapped in from six to eight years after transplanting."

Plant nut-growing trees, black walnuts, butternuts, chestnuts, hickories, and pecans in their latitude, and raise valuable timber from them, and plenty of rich nuts at the same time. The black walnut throws down a tap root, rendering it unadapted to transplanting; and hence, with most other nuts, had best be planted, immediately after dropping in the Autumn, where they are wanted in the tree belt. Plant these nuts in rows eight feet apart, and four feet apart in the rows, subsequently thinning out every other tree. Nuts should be planted near the surface, covering them with coarse chips or straw, and the roots will spread upon the top of the ground. Butternuts, or white walnut trees, twelve years old, will often measure twelve inches in diameter.

Beside the crops of potatoes, beans, peas, and corn, that can be produced the first few years among the trees forming the belt, blackberries and raspberries can be raised to good advantage, as shade is their natural habitat, and blackberries particularly often fail because of too much sun exposure. E. MOODY stated, at the meeting of the Western New York Horticultural Society, in January, 1869, that he had a row of raspberries, part of which was protected by evergreens; the protected part had four times as much fruit in the same space as the unprotected portion.

Where to Place Belts.—If we make shelter belts to protect our fields from the cold of Spring and early Summer, we must plant them on the southwest approaches; if for Autumn and Winter, on the northwest. In dividing the Western States into sections, it would have been much better had the surveyors run the range lines northeast instead of, as now, to the



TREE BELT ON NORTH AND WEST.

north. A farm thus laid out would have presented a square front to the two prevailing

winds—that of the southwest, which occurs during at least three-fourths of the year, and the chilling, biting blasts of Winter, from the northwest. In this case belts would be required only on two sides of the farm; but, as the sections are laid out, many of the farmers of the Mississippi and Ohio valleys must plant on the south, the west, and the north, leaving the farm open to the east. In some localities, where one of these approaches is naturally shielded by a range of hills or natural forest, a belt in that direction would be comparatively superfluous. In the Eastern and Middle States, and in some portions of the West, belts need be placed only on the north and west.

How Far will a Tree Belt Protect?—A mature tree belt, properly located and grown, will somewhat protect the whole area of a quarter-section farm; for it will lift the wind off its feet, so to speak, so thoroughly that it will with difficulty regain its hold. But the rule, confirmed by practical experience is, that a belt will turn the wind from land adequately, only a distance of eleven times its height; that is, a belt forty feet high will protect crops on the leeward side, for a lateral distance of four hundred and forty feet. But a belt will also screen crops on the windward side for at least five times its height—that is, the back-set or reflex protection is equal to one-half the direct protection. This is on the principle that water within a mill-dam is compressed into quietness, and air on the windward side of a hill, when the wind blows at right angles, is generally calm and equable.

From this rule, it follows, that a square farm of forty acres would be adequately protected by two tree belts forty feet high, set at the same angle against the prevailing wind, one within the other, and six hundred feet apart. If a belt can be set on a ridge, it will, of course, furnish considerable additional defense.

No Waste Land Involved.—To equip an exposed farm with ample tree belts, involves no waste of land—for they need not occupy the area that ought to be covered with wood on every farm. To fulfill the various requirements of fuel, moisture, health, and shelter, one-fifth of the whole country should be devoted to wood. This is sufficient to put a compact belt seven rods wide, along two sides of every forty acres of land. Such a width gives ample room in each belt for ten rows of trees, planted quincunx, and it is desirable that these should present

some variety. The outer row should be of cedar, or some densely-growing evergreen; then two rows of hickories may find room; the middle rows may be the taller sorts of pines, Scotch larch, or Norway spruce; the belt finishing, on its inner side, with deciduous trees, for fruit or fuel and timber, according to need or fancy.

Thus, it appears that not only does the belt waste no land, but it actually should be a source of additional revenue. With proper belts the number of our agricultural products might be more varied; the annual profit of the crops now cultivated would be increased; the quality of those crops would be improved; the health, comfort, and enjoyment of both "man and beast" would be promoted; and with judicious management, these tree belts would very soon yield an annual income, that would amply repay their cost, in addition to all their incidental advantages. Without them, there are States in the West wherein neither fruit nor wheat can ever be relied on for a certain harvest.

FUEL—WOOD, COAL, AND PEAT.

Heating Values of Different Kinds of Wood.—A great mistake exists in the minds of men as to the relative values of different woods as to their ability to produce heat. Certain kinds of wood are preferred by the purchaser because, when he has to pay for preparing and handling wood to burn, he wishes it as solid and as lasting as he can obtain it. But the lower rates at which he may obtain other wood than hickory and hard maple, may, on examination, prove to him that it is economy even to buy, prepare, and use a greater quantity of other kinds.

MARCUS BULL, of Philadelphia, has confirmed the following table, arriving at results nearly similar. His experiments went to prove that four cords of hickory wood, four and three-fourths of white oak, six and two-thirds of hard maple, seven and one-fifth of soft maple, nine and one-fifth of white pine, or nine and one-seventh of pitch pine, give out as much heat as four tons of anthracite coal. A knowledge of these facts should aid those who purchase their fuel, in determining which is the cheapest for them at any given time, and in any market.

The table records the result of a series of careful experiments instituted by Count RUM-

FORD, to ascertain the comparative value of different kinds of wood for fuel:

KINDS OF WOOD.	Value as Fuel.	Proportion of Charcoal per 100 parts of Wood.
Shellbark Hickory.....	100	25.12
Pignut Hickory.....	95	25.22
Swamp White Oak.....	86	22.76
White Oak.....	81	21.62
Redheart Hickory.....	81	22.90
White Ash.....	77	25.74
Dozwood.....	75	
Post Oak.....	74	21.59
White Hazel.....	72	
Pin Oak.....	71	22.22
Apple Tree.....	70	25.00
Red Oak.....	69	22.43
Black Walnut.....	65	22.56
Beech, white.....	65	19.62
Birch, black and yellow.....	63	19.40
Sugar Maple.....	60	21.70
Yellow Oak.....	60	21.60
White Elm.....	58	24.85
Red Cedar.....	56	24.35
Wild Cherry.....	55	21.70
Soft Maple.....	54	20.61
Yellow Pine.....	54	23.77
Tulip, Chestnut, & Yellow Poplar.....	52	21.81
Butternut.....	51	20.76
Jersey Pine.....	48	24.88
White Birch.....	48	
Pitch Pine.....	43	
White Pine.....	42	24.33
Lombardy Poplar.....	40	12.89

The Loss Suffered in Green Wood.—Many people imagine that green wood yields more heat than dry. This is impossible, since a portion of the heat is required to vaporize the water, and escapes as latent heat in the steam thus produced. Dry wood is not only much more pleasant to use, but is really more economical. The quantity of sap or water in green wood newly cut, varies from twenty to fifty per cent. With a year's air exposure it parts with about half its water; fifteen per cent. more may be expelled by artificial heat, but it only loses the last of its moisture as it begins to decompose or char. The presence of water in wood diminishes its fuel value by hindering and delaying the combustible process, and wasting heat by evaporation. Suppose that one hundred pounds of wood contain thirty of water, they have then but seventy of true combustible material; and when burned, one pound of the wood will be expended in raising the temperature of the water to the boiling point, and six more in converting it into vapor, making a loss of seven pounds of real wood, or one-tenth of the combustible force. Besides this dead loss of ten per cent. of fuel, the water present is an annoyance by hindering free and rapid combustion.

S. D. NEWBRO, of Ingham county, Michigan, writes to the *American Agriculturist* to the following effect: That by careful experiment he finds green beech and maple wood, cut in the

Winter, and kiln-dried, or thoroughly seasoned, to lose three-eighths of its original weight; that a cubic foot of either kind in the green state weighs about sixty pounds on an average, there being a difference between the butt-end and top-ends of a log, and some trees are closer and firmer grained than others; that a full cord of such green wood weighs about 7,680 pounds, but if 1,680 pounds, *i. e.* a little over one-fifth, be deducted for the open spaces in wood, as usually corded, it leaves 6,000 pounds as the weight of a cord of four-foot green wood, or 4,500 pounds for three-foot wood, or 2,250 pounds for eighteen-inch wood. Practically, the experiments show that *five cords of green wood are as heavy as eight dried; that it requires as much physical force, man and horse power, to move fifty cords of green wood as eighty of dried wood; and that the man who carries into his house ten cords of four-foot green wood carries in with it over eleven tons of water.* Sixty pounds of green wood will warm a room the same as thirty-eight pounds of dried; and the sixty pounds of green wood, while burning, discharges into the fire, in the form of vapor, just twenty-two pounds, or two gallons and three quarts of water, which, in changing to steam, carries off a great amount of heat in a latent, useless state.

The Test of Value.—The value of fuel, as a heating material, is determined by the amount of water which a pound will raise to a given temperature; thus one pound of good wood will convert forty pounds of ice to boiling water, while a pound of coal will thus heat nearly eighty pounds of ice-cold water; hence, pound for pound, coal is as good again for mere heating purposes, as wood is as good again as peat, which is the product of sedges, weeds, rushes, mosses, etc.

Varieties of Fuel Compared.—Some woods are softer and lighter than others, the harder and heavier having their fibers more densely packed together. But the same species of wood may vary in density, according to the conditions of its growth—those growing in forests, or in rich, wet grounds, being less consolidated than such as stand in open-field exposures, or grow slowly upon dry, barren soils.

Wood is the healthiest fuel, because it contains a large amount of oxygen; coal has none, hence in burning it, the oxygen necessary for its combustion must be supplied from the air of the room, leaving it "closely" oppressive. Wood alone should be used in heating sleeping

apartments. A coal fire will go out unless it has a constant and large supply of air, while wood, with comparatively little, having a large supply within itself, turns to "live coals." Close-grained, heavy wood, like hickory and oak, give out the most heat; while pine and poplar, being open-grained, heat up the quickest.

Another Table of Values.—The weight of wood to the cord, and the time, in hours and minutes, during which ten degrees of heat were maintained in a room by the combustion of one pound of each of the principal kinds most used for fire-wood, together with their comparative values, shellbark hickory being taken as the standard, is given in the following table:

NAMES OF TREES.	Pounds in a cord.	Time.	Value.
Shellbark Hickory.....	4,469	6.40	\$7 40
Pignut Hickory.....	4,241	6.40	7 03
Redheart Hickory.....	3,705	6.30	6 13
Chestnut White Oak.....	3,935	6.30	6 51
Shellbark White Oak.....	3,464	6.20	5 73
White Oak.....	3,821	6.20	6 00
Barren Scrub Oak.....	3,339	6.30	5 46
White Ash.....	3,459	6.40	5 70
White Beech.....	3,236	6.00	4 81
Black Birch.....	3,115	6.00	4 67
White Elm.....	2,592	6.40	4 29
Hard Maple.....	2,878	6.10	4 51
Soft Maple.....	2,668	6.10	4 41
Yellow Pine, soft.....	2,463	6.30	4 10

The amount of heat produced by one pound of each kind of wood does not greatly vary, so that for convenience we may consider the heating power of each kind the same, pound for pound.

Thus it will be seen that a cord of shellbark hickory weighs about twice as much as a ton of coal—which measures twenty-eight bushels and weighs two thousand two hundred and forty pounds. Experiments already adverted to, show that a pound of anthracite coal is equal in producing heat to two pounds of shellbark hickory. Coal at ten—perhaps even twelve dollars per ton—is as cheap as shellbark hickory wood or its equivalent of other kinds, at ten dollars a cord. It would be much more equitable if wood was thoroughly dry, to sell it by the pound, as is the custom in France.

Coal as Fuel.—Coal gives evidence of having been derived from an ancient vegetation, which was by some unknown means buried in the earth, and there slowly charred; the properties of the different varieties depending upon the degree to which this charring process has been carried. In anthracite, which is the densest and stoniest of all, it seems to have reached its last stage; the volatile substances

are nearly all expelled, so that nothing remains but pure carbon, with a trace of sulphur, and the incombustible ash. The bituminous variety has undergone a less vigorous charring operation, and still contains bitumen or pitch, a substance rich in hydrogen; this ignites readily, and burns with much flame and smoke. Its heat is far less violent than that of anthracite. The residue left after charring, is called coke.

How to Burn Coal.—1. To make a coal fire; put in a double handful of shavings, or use kindling wood instead. Fill the earthen cavity (if the stove has one) nearly full of chunks of dry wood, say four or six inches in length. On the top put about a dozen lumps of egg coal. In ten minutes add about twenty lumps more of coal. As soon as the wood has burned out, fill the cavity half to two-thirds full of coal. The fire will be a good one. The coal, will, by these directions, become thoroughly ignited. 2. Never fill a stove more than half or two-thirds full of coal even in the coldest weather. 3. When the fire is low, never shake the grate or disturb the ashes, but add from ten to fifteen small lumps of coal, and set the draft open. When these are heated through, and somewhat ignited, add the amount necessary for a new fire, but do not disturb the ashes yet. Let the draft be open half an hour. Now shake out the ashes. The coal will be thoroughly ignited and will keep the stove at a high heat from six to twelve hours, according to the coldness of the weather. 4. For very cold weather. After the fire is made, according to rules first and third, add every hour twelve or twenty lumps of coal. You will find that the ashes made each hour will be in about that rate.

The art of burning coal is not properly understood as it ought to be. Too much coal is usually placed in the stove, by which the draught is destroyed, and the gases are imperfectly consumed. There are two errors in the way we burn coal, by which more than one-half is wasted. First, we have to shut the door of our stove or furnace to make a temporary overcombustion at one time, and at another time we have to leave open the door and let in cold air to cool off. Second, the gas that ascends our chimneys carries off with it a deal of coal that is unburned, merely coal in vapor, which gives out little heat for want of air to consume it. We lose the most of the unconsumed vapor of coal when the door is shut. When it is open the vapor is consumed, but the heat is reduced by a flood of cold air, and carried up the chimney. What is required then

is an air-tight door over the ash pit, through which you can let in just what air is necessary for quick or slow combustion as desired. The door that admits the coal should be tight, and should never be opened, except to put coal in. A small flue should admit a stream of air, heated by contact with the stove, to mix with the gas on top of the fire. In buying a stove, if you find that the stove or furnace door must be left open when you want to moderate your fire, reject it, for it is essentially wrong in its construction, and it will consume three tons of coal where one would answer if the draft door was air-tight.

There is an economy in the use of coal that is not generally known, which may be employed to great advantage. We allude to the consumption of the ashes and cinders, without sifting, either in grate or stove, by which one-third, if not one-half, of the fuel may be saved, without diminishing the heat. Instead of throwing away the ashes and cinders, as is universally the case, have a water-tight vessel or box, into which they should be mixed with water, until forming a thick mortar or paste. A few lumps of coal fairly ignited, with a thick layer of this compost, superimposed, will make a first-rate fire, and continue to burn as long as, or longer than, a grate or stove fired with coal, the luxury of a blaze being alone wanting, but none of the properties of heat. The trouble is trifling, and the whole process, which may be performed in a common ash pan, is not greater than the removal of the ashes, and casting them out of doors. The prudent housewife will soon perceive that she has been throwing away the best properties of the coal, and this economy peculiarly addresses itself to those occupying rooms above a first floor.

Peat.—Beds of peat are found scattered all over the northern portions of our country, and are quite inexhaustible. Peat consists of a solidified form of vegetable matter, which, when

dried in the sun or compressed by machinery, burns like bituminous coal. It is cut out in blocks about twice the size of a common brick, and is soft, resembling lard or butter. It is then pressed in a machine, and afterward dried in the sun, or under sheds to keep the rain and dews from it, and is ready for market. It dries in about a week, and attains almost the density of coal. For burning purposes it far excels bituminous coal, and burns without a disagreeable odor, leaving a white ash. It has been tried on railroad locomotives, and in forges and founderies, and has given a greater degree of heat, pound for pound, than the best anthracite or bituminous coal. The great problem in the economical use of peat is, the invention of machinery by which it can be cheaply and rapidly prepared for use.

Other Articles of Fuel.—Charcoal is the part that remains, when wood has been slowly burned in pits or close vessels, with but a limited supply of air, so that all its volatile or gaseous elements are expelled. Wood yields from fifteen to twenty-five per cent. of its weight in charcoal—the more the process is hastened, the less the product. It ignites readily, and consumes rapidly, producing a larger amount of heat than equal weights of any other fuel; one pound of wood charcoal raising from the freezing to the boiling point seventy-three pounds of water, while one pound of mineral coal will thus raise but sixty pounds of water, and one pound of dry wood, thirty-five pounds. While all kinds of charcoal are alike as to color, a ton of pine charcoal will last but seventy-five days, while a ton of maple charcoal will last one hundred and fourteen days, and a ton of oak charcoal, one hundred and sixty-six.

Alcohol, turpentine, gas, resin, kerosine, and various oils, are used to a limited extent for heating purposes, but require no particular notice.

LIVE STOCK:

HORSES, CATTLE, SHEEP, AND HOGS; BREEDING, FEEDING, CARE AND MANAGEMENT.

IN this chapter we shall treat of those domestic animals which are bred and kept upon the farm. Proper attention to Live Stock has already been spoken of as lying at the foundation of successful agriculture. CULLEY, an English writer, said, almost a hundred years ago: "A knowledge of stock is, at this period of improvement, as necessary for the farmer as the proper cultivation of a field for wheat, barley, turnips, or any other crop. For, according to the present improved system of farming, there is such a connection between the cultivation of the ground and breeding, rearing, and fattening cattle, sheep, and other domestic animals, that a man will make but an indifferent figure in rural affairs if he does not understand the latter as well as the former."

The horse and neat cattle, the sheep, hog, and goat have been known from the dawn of civilization, and were mentioned by almost all the ancient writers.

There appears to have been no horned cattle in either division of this continent prior to its discovery. The first were imported by Columbus in 1493. Lieutenant GIBBON, in his Exploration of the Valley of the Amazon, says: "When the cattle came among the Indians they knew not what to make of them. There were no such animals in their wild lands. The fierce tiger and the poisonous serpent which they worshiped, were outdone. The cow interfered with the belief they previously had, that the largest animals were God's favorites, particularly those which had the greatest means for active aggression or self-defense. The cow helped to change such a religion. By degrees they learned that she neither bit, clawed, nor stung; that she carried a bag full of milk; that her teeth were given her to cut the pampa grass, and not to devour the flesh of a human

being; that she was docile and friendly to man, and not his enemy. The Jesuit missionaries taught the Indians how to milk the cow and how to use her milk. They soon learned how to tend cattle, to lasso them, and to yoke them by the horns, so that they might drag along a bundle of driftwood from the edge of the river to the middle of the plain. In this way they kept cattle near them, while herds roamed through the pampas, became wild, and are now so scattered through the lands that it is difficult to count them."

The wild horse of America is also, doubtless, of Spanish origin, and of the Andalusian breed. In this the authorities generally agree. From the chargers that escaped from the calvacade of DE SOTO and bold South American adventurers, have come the wild race of the pampas and the prairies.

The first cattle received by the Plymouth Colony came over in the ship *Charity*, in 1624, a sort of Devon, imported by Governor WINSLOW. Two or three years later, the Dutch took cattle to New York, and the Danes a yellow breed to New Hampshire, and from crosses of these, and later arrivals, have come the present so-called "native" stock of New England. So important were the early acquisitions of stock considered, that an order appears to have been issued in Virginia forbidding the killing of domestic animals on the pain of death to the principal, burning of the hand and cropping of the ears of the accessory, and a sound whipping of twenty-four hours to the concealer of the facts. This was encouragement with a vengeance to the raising of cattle, and it had the intended effect.

Few, even of those directly engaged in the raising and feeding of live stock, are aware of the enormous value of this source of the farm-

er's wealth. From the census reports of 1850 and 1860, we find that there were within our borders:

	Horses, Asses, & Mules.	Neat Cattle.	Sheep.	Swine.
In 1850,...	4,891,150	8,085,838	21,723,220	30,354,213
In 1860,...	7,400,322	15,322,950	22,471,275	33,512,867

Of cattle, alone, according to the estimate of Mr. YOUATT, not less than 1,600,000 head are consigned to the butcher every year in Great Britain, while the entire value of the national live stock is \$600,000,000. We have in America about twice as many neat cattle as Great Britain, the same number of sheep, and ten times as many swine.

The aggregate value of live stock in these States and Territories, in 1850, was \$545,180,516; and in 1860 it was \$1,089,329,915—showing an increase in ten years of \$545,149,396, or about 100 per cent. The increase in its value in the New England States was 36 per cent.; in the Middle States, 52 per cent.; in the Western States, 143 per cent.; in the Southern States, 86 per cent.; in the Pacific States, 576 per cent. The increase was greatest in California and Texas—the former having grown from \$3,000,000 to \$35,000,000, and the latter from \$10,000,000 to \$40,000,000. From these figures it would appear that the value of the live stock of American farms is greater than that of all the product of wheat, rye, corn, oats and potatoes.

The following table has been prepared to show, approximately, the amount of live stock raised in the States referred to, during 1860 and 1865:

STATE.	1860.	1865.
Maine.....	\$ 15,437,533	\$ 23,721,811
New Hampshire.....	10,924,627	13,852,622
Vermont.....	16,241,989	27,473,732
Massachusetts.....	12,737,741	18,263,194
Rhode Island.....	2,042,044	3,735,917
Connecticut.....	11,311,079	17,209,930
New York.....	103,896,296	170,552,506
New Jersey.....	16,134,633	27,055,185
Pennsylvania.....	69,672,726	123,847,743
Maryland.....	14,667,533	20,161,813
Delaware.....	3,144,706	4,469,869
Kentucky.....	61,868,237	60,348,250
Ohio.....	80,384,819	141,215,182
Michigan.....	23,714,771	52,091,122
Indiana.....	41,855,539	88,657,071
Illinois.....	72,501,225	115,339,232
Missouri.....	53,693,673	59,016,699
Wisconsin.....	17,807,375	47,635,107
Iowa.....	22,476,293	71,946,682
Minnesota.....	3,642,841	12,671,207
Kansas.....	3,332,450	9,127,306
Nebraska Territory.....	1,128,771	3,841,164
Total.....	\$658,577,285	\$1,101,994,344

In 1862, there were sent eastward from Chicago:

	Quantity.	Value.
Cattle, number.....	109,304	\$3,279,120
Hogs, live, number.....	446,425	3,218,128
Hogs, dressed, number.....	44,609	358,872
Beef, barrels.....	149,838	1,758,056
Pork, barrels.....	192,549	1,925,490
Cut meats, pounds.....	71,840,797	4,310,148
Lard and tallow, pounds.....	63,937,064	5,119,560

To Estimate Live Weight.—The following rules for approximating the weight of live stock by measurement will be found valuable. If the dressed weight of a live animal can be nearly approximated by them, they will prove of real value to the buyers and sellers of stock. The girth is the circumference of the animal just behind the shoulder blades. The length is the distance from the shoulder blades. The superficial feet are obtained by multiplying the girth by the length. If less than one foot in girth, multiply superficial feet by eight. If less than three, and more than one, multiply superficial feet by eleven. If less than five, and more than three, multiply superficial feet by sixteen. If less than seven, and more than five, multiply superficial feet by twenty-five. If less than nine, and more than seven, multiply superficial feet by thirty-three. If less than eleven, and more than nine, multiply superficial feet by forty-two.

Example: Suppose the girth of a bullock to be six feet three inches, length five feet six inches; the superficial area will then be thirty-four; and, in accordance with the preceding rules, the weight will be seven hundred and eighty-two pounds.

Example: Suppose a pig to measure in girth two feet, and in length one foot and nine inches. There would then be three and a half feet, which, multiplied by eleven, gives thirty-eight and a half pounds as the weight of the animal.

The net weight of fatted swine is four-fifths of the gross weight.

Breeds and Breeding.—Breeding bears the same relation to farm stock that grafting bears to fruit, and the principle of selection to the cereals. As the flint wheat, the Concord grape, and the Bartlett pear, have resulted from the intelligent choice and culture of the best varieties, so are the stud, herd, and flock improved by similar care in perpetuating the highest qualities.

"In view of the large amount of property invested in live stock in this country, we should make use of all the aids and means within our reach to improve the quality, and, by borrow-

ing the experience as well as drawing from the herds and flocks of other countries, endeavor to adapt to our various localities and climates the best and most profitable breeds of domestic animals. Suppose that by judicious selections, an infusion of better breeds, and a more accurate knowledge of the principles and practice of breeding and feeding stock, we could add twenty per cent. to the annual profit of our animals in early maturity and in an increased product of milk, butter, or beef, we should have an annual additional value, equal to that derived from an increased capital of six hundred millions! In England, such and even greater results have attended upon the application of science and improved management to the live stock of that country. Cattle breeding has become a science; and when such men as BAKEWELL, the brothers COLLINGS, the Earl of LEICESTER, BATES, QUARTLY, TOMKINS, BOOTH, and WEBB, in England; D' AUBENTON, CUGNOT, and SPECK, on the Continent, and many others whose names are equally identified with the amelioration of their favorite breeds of cattle or sheep, devoted themselves to this branch of agricultural knowledge, we need no longer wonder that it soon assumed the dignity of a science, or that the ends attained were worthy the talents, energy, time, and money expended upon it. For more than a century have such minds labored to accomplish the results which are now proudly pointed to, in the matchless herds and flocks whose fame is spread over the whole world.⁷²

The possibility suggested in the above paragraph, of adding twenty per cent. to the value of American live stock, by better breeding and feeding, is quite within bounds. In the year 1710, the average weight of beef cattle, at Smithfield market, London, was 370 pounds. In 1795, the average weight was 462, an increase of one-fourth; and in 1830, the average was 656 pounds, an increase of nearly one-half in thirty-five years, and of eighty per cent. in a century. Since this point it has been steadily improving.

In America, it has been calculated that the cattle offered at the Brighton market, near Boston, average fifty per cent. more in weight, at the present time, than they did twenty years since. Within the memory of living men, there has been an incredible improvement in the average of farm stock. Though native mongrels and scrubs are still the rule, their propor-

tion to the whole is rapidly diminishing, and at almost every local agricultural fair, pure thorough-bred stock may be seen on exhibition. The day can not be very distant, when the inferior breeds will have disappeared from the land. Careless farmers and breeders are not always to be in a majority. Of this we are assured, by the fact that skill in the breeding and management of domestic animals will always, as now, be regarded by the production of individual specimens of unusual beauty and excellence.

One of the most prominent points of American improvement has been, the more economical and judicious management of such of the domestic animals as form so large a portion of our food. The growth of new varieties of grain, of roots, and vegetables, has done immense good; these, assisted by improved culture and artificial manurings, have wrought astonishing alterations, and great increase of produce on every intelligent man's farm; but these have been exceeded by the improvement made in breeding, feeding, and management of the live stock of the farm.

Contrast, for a moment, the cattle of thirty years' since, those which were called "native stock," though owing their origin to every country of the Old World—the long, high, thin, lean-fleshed, large-boned, hard, unthrifty animals of that day, with the compact rotundity of shape, the soft, mellow, thrifty animals of the present day; the former fed at six and seven years, the latter making prime beef at three, and often killed earlier.

The same remark will apply to sheep and pigs, and not less to poultry. Early maturity, and quickness in fattening, have been looked to as the decided characteristics in every variety of meat-producing animals. The great improvement in cattle and sheep for the shambles, consists in perfecting these three great cardinal points:

1st. The early period at which they are ripe for the butcher.

2d. The great amount of food they produce in return for the food they consume.

3d. The large proportion of prime meat which they yield.

It costs no more to keep a good animal than it does to keep a poor one, and in many cases not so much. It costs no more to keep a sheep that yields a fleece of fifteen pounds than it does to keep one that yields five pounds. A breed of cattle that attain their full growth at three years of age, is much more profitable than

⁷²Essay in U. S. Agricultural Report, by FRANCIS M. ROTCH.

a breed that do not get their full growth until they are four or five years old. All that is said and written respecting the forcing by good manure and the carefully weeding and cultivating, so as to give every chance for full development of fruit, will equally apply in forcing by good food and carefully sheltering from extremes of heat or cold, and by producing nothing but from the most highly-prized varieties of live stock.

S. L. GOODALE, of Maine, in an excellent essay on this subject, in the United States Agricultural Report for 1862, says: "What we do not know is a deal more than what we do know; but to ignore so much as has been discovered, and is well established, and can be learned by any who care to do so, and to go on regardless of it, would indicate a degree of wisdom in the breeder, on a par with that of a builder who should fasten together wood and iron just as the pieces happened to come to his hand, regardless of the laws of architecture, and expect a convenient house or fast-sailing ship to be the result of his labors.

"Is not the usual course of procedure among many farmers too nearly parallel to the case supposed? Let the ill-favored, chance-bred, mongrel beasts in their barn-yards testify. The truth is, and it is of no use to deny or disguise the fact—the *improvement* of domestic animals is one of the most important, and to a large extent, one of the most neglected branches of rural economy. The fault is not that farmers do not keep stock enough; oftener they keep more than they can feed to the most profitable point, but the majority neither bestow proper care upon the selection of animals for breeding, nor do they appreciate the dollars and cents difference between such as are profitable and such as are profitless. How many will hesitate to pay a dollar for the services of a good bull, when some sort of a calf can be gotten for a 'quarter?' and this, too, when one by the good male would be worth more for veal, and ten or twenty dollars more when grown to a cow or an ox. How few refuse to allow to a butcher the cull of his calves and lambs for a few extra shillings, and this when the butcher's difference in shillings would soon, were the best kept and the worst sold, grow into as many dollars and more? How many there are who esteem size to be of more consequence than symmetry, or adaptation to the use for which they are kept? How many ever sit down to calculate difference in money value between an animal which barely pays for keeping, or perhaps not

that, and one which pays a profit? Let us reckon a little. Suppose a man wishes to buy a cow. Two are offered him, both four years old, and which might probably be serviceable for ten years to come. With the same food and attendance, the first will yield for ten months in the year an average of five quarts per day, and the other for the same term will yield seven quarts and of equal quality. What is the comparative value of each? The difference in yield is six hundred quarts per annum. For the purpose of this calculation we will suppose it worth three cents per quart, amounting to eighteen dollars. Is not the second cow, while she holds out to give it, as good as the first, and three hundred dollars at six per cent. interest besides? If the first just pays for her food and attendance, the second, yielding two-fifths more, pays *forty per cent. profit* annually; and yet how many farmers having two such cows for sale would make more than ten, or twenty, or, at most, thirty dollars difference in the price? The profit from one is eighteen dollars a year; in ten years, one hundred and eighty dollars, besides the annual accumulations of interest. The profit of the other is nothing. If the seller has need to keep one, would he not be wiser to give away the first than to part with the second for a hundred dollars? Suppose, again, that an acre of grass or a ton of hay cost five dollars, and that for its consumption by a given set of animals the farmer gets a return of five dollars' worth of labor, or meat, or wool, or milk. He is selling his crop at cost, and makes no profit. Suppose by employing other animals, better horses, better cows, oxen, and sheep, he can get ten dollars per ton in return. How much are the latter worth more than the former? Have they not doubled the value of the crops, and increased the profit of farming from nothing to a hundred per cent.? Except that the manure is not doubled, and the animals would some day need to be replaced, could he not as well afford to give the price of his farm for one set as to accept the other as a gift?"

Periods and Conditions of Gestation.—The gestatory term in quadrupeds is much regulated by their bulk. In the elephant it is about twenty months, in the camel between eleven and twelve, in the mare and ass the same. According to the observations of M. TEISSIER, of Paris, in 582 mares, which copulated but once, the shortest period was 287 days, and the longest 419; making the extraordinary difference of 132 days, and of 85 days

beyond the usual term of 11 months. The cow usually brings forth in about nine months, and the sheep in five. Swine usually farrow between the 120th and 140th day, being liable to variations, influenced apparently by their size and their particular breeds. In the bitch, on the contrary, be she as diminutive as a kitten, or as large as the hound, pupping occurs on or about the 63d day. The cat produces either on the 55th or 56th day. The true causes which abridge or prolong, more or less, the pe-

riod of gestation in the females of quadrupeds, and of the incubation of birds, are yet unknown to us. Many persons are also unacquainted with the proper age for reproduction, the duration of the power of reproduction, and other conditions even of the domesticated animals. It can not, therefore, but be interesting to find in the following table the results of observations made on this subject by the best ancient and modern naturalists, compiled by JOHNSON, for the farmers of England:

KINDS OF ANIMALS.	Proper age for reproduction.	Period of the power of reproduction.	Number of females for one male.	The most favorable season for copulation.	Period of Gestation and Incubation.		
					Shortest period.	Mean period.	Longest period.
Mare.....	4 years.	Years.			Days.	Days.	Days.
Stallion.....	5 "	10 to 12	.....	May,	322	347	419
Cow.....	3 "	12 to 15	20 to 25				
Bull.....	3 "	10	5	July.	220	284	321
Ewe.....	2 "	6	50 to 40				
Ram.....	2 "	7	40 to 50	Nov.	146	154	161
Sow.....	1 "	6					
Boar.....	2 "	6	6 to 10	March,	109	115	143
She goat.....	2 "	6					
He goat.....	2 "	5	20 to 40	Nov.	150	156	163
She ass.....	4 "	10 to 12		May.	365	380	391
He ass.....	5 "	12 to 15					
She buffalo.....	2 "	8 to 9			281	308	235
Bitch.....	2 "	8 to 9		Feb.	55	66	63
Dog.....	1 "	5 to 6					
She cat.....	1 "	9 to 10	5 to 6		48	50	56
He cat.....	1 "	9 to 10	5 to 6				
Doe rabbit.....	6 months.	5 to 6		Nov.	20	28	35
Buck rabbit.....	6 "	5 to 6	50				
Cock.....	6 "	5 to 6	12 to 15				
Turkey, sitting } hen	.....	.....	.....	.....	17	24	28
} on the eggs of } duck	.....	.....	.....	.....	24	27	30
} the	.....	.....	.....	.....	24	26	30
Hen sitting on } duck	.....	.....	.....	.....	25	30	34
} the eggs of the } hen	.....	3 to 5			19	21	24
Duck.....	.....	.....	.....	.....	28	30	32
Goose.....	.....	.....	.....	.....	27	30	33
Pigeon.....	.....	.....	.....	.....	16	18	20

In some latitudes in this country, July will be too late for the best month of copulation for the cow.

Producing the Sexes at Will.—In a treatise published by Professor THURY, of Geneva, Switzerland, he gives a summary of his observations and deductions on the subject of producing sexes at will. He announces the discovery, that, in the case of animals that usually produce but one at a birth, and have a regular rutting season, it is perfectly easy to produce the sex most desired.

The pith of the theory is, that before the ovum has reached a certain degree of maturity, it will invariably produce a female offspring; while, on the other hand, it is equally certain to produce a male *after it has passed* that degree of maturation.

The Professor's application of the theory consists in ordering that the female, when it is desired to produce a female offspring, be brought to the male *at the beginning of the rutting season*, or toward the close of that season, if it is desired to produce male offspring.

M. CORNAX, of the Canton of Vaud, reports that he has made twenty-nine careful experiments with cows, with a view to test the practical value of this theory, and that every experiment was successful. In twenty-two cases he desired to produce females, meeting with success in every case; in the seven experiments he desired to produce males, and in these he succeeded equally well.

ARISTOTLE observed that the pigeon ordinarily laid two eggs, and that, of these two eggs, one produced a male and the other a female. He found that the first egg gave the male and the second the female, but he searched in vain for the philosophy of it. M. FLOURENS experimented on this phenomena, and in eleven repetitions the first egg invariably produced the male and the second the female.

If MM. CORNAX and FLOURENS report correctly, it would seem that the Professor's theory may not be without foundation. It is very easily put to the test, and we doubt not that it will soon either be established or exploded. We ought to say that Professor THURY is him-

self, of the opinion, that it can only be relied on where the animal is running out, in a normal condition.

Physiology of Breeding.—The axiom that "like begets like" is good as far as it goes, and, if all animals were in a condition of nature, it might be a sufficient guide; but with domestication come disturbing influences. What every stock grower wants is, as BAKEWELL expressed it, "the best machine for converting herbage and other animal food into money." This can be produced only by attending to certain rules which the experience of stock growers have established.

The law of similarity directs the hereditary transmission of certain qualities possessed by one or both parents; and within certain limits it is invariable. The lesson which it teaches is, *breed only from the best.*

A family in Yorkshire is known for several generations to have been furnished with six fingers and toes. A family possessing the same peculiarity resides in the valley of the Kennebec, and the same has reappeared in one or more other families connected with it by marriage. The thick upper lip of the imperial house of Austria, introduced by the marriage of the Emperor MAXIMILIAN with MARY of Burgundy, has been a marked feature in that family for hundreds of years, and is visible in their descendants to this day. Equally noticeable is the "Bourbon nose" in the former reigning family of France. All the Barons de VESSIUS had a peculiar mark between their shoulders, and it is said by means of it a posthumous son of a late Baron de VESSIUS was discovered in a London shoemaker's apprentice. HALLER cites the case of a family where an external tumor was transmitted from father to son, which always swelled when the atmosphere was moist. The famous English horse Eclipse had a mark of a dark color on his quarter, which, although not a defect, was transmitted to his progeny even to the fifth generation.

These facts show how necessary it is to have regard to every particular; not only the general appearance, size, shape, length of limb, strength, thickness of skin, length of hair, docility, etc., but also structural defects and hereditary diseases. YOUTT says: "There is scarcely a malady to which the horse is subject that is not hereditary."

The law of variation teaches that breeds diverge from their pure character under the influence of climate, food, care, and habit. Subjected to widely different conditions of living,

pure breeds change their size, and even their structure, and at last adapt themselves completely to the necessity of the situation. The breeder has to deal with these divergencies and tendencies. His aim should ever be to *grasp and render permanent, and increase so far as practicable, every variation for the better, and to reject for breeding purposes such as show a downward tendency.*

Among the "faint rays" alluded to by Mr. DARWIN, as throwing light upon the changes dependent on the laws of reproduction there is one, perhaps the brightest yet seen, which deserves notice. It is the apparent influence of the male first having fruitful intercourse with a female upon her subsequent offspring by other males. After a mare has borne a mule, she can never afterward be relied on to bring forth a colt of any value, because it will be apt to bear so close a resemblance to a mule as to render it unsaleable. So a bull will frequently transmit his qualities to several generations of calves, although only one is of his get. The mare and cow seem to be more likely to receive and repeat the characteristics of the first bull or stallion than any subsequent one. Dr. CARPENTER, in the last edition of his work on physiology, says it is by no means an uninfrequent occurrence for a widow who has married again to bear children resembling her first husband.

Recently, in a paper published in the *Aberdeen Journal*, a veterinary surgeon, Mr. JAMES MCGILLIVRAY, of Hunley, has offered an explanation which seems to be the true one. His theory is, that "when a pure animal of any breed has been pregnant by an animal of a different breed, she is a cross ever after, the purity of her blood being lost in consequence of her connexion with the foreign animal, herself becoming a cross forever, incapable of producing a pure calf of any breed."

Relative Influence of Parents—W. C. SPOONER, veterinary surgeon, says, in speaking of the relative influence of parents: "The most probable supposition is that the propagation is done by halves, each parent giving to the offspring the shape of one-half of the body. Thus the back, loins, hind-quarters, general shape, skin, and size follow one parent; and the fore-quarters, head, vital, and nervous system, the other; and we may go so far as to add that the former, in the great majority of cases, go with the male parent, and the latter with the female."

Among recent interesting theories on this branch of the subject, is that of Mr. ORTON, presented to a Farmers' Club, in England. It

is, briefly, that the male parent chiefly determines the external characters, the general appearance, in fact, the outward structure and the locomotive powers of the offspring, as the framework, or bones and muscles, more particularly those of the limbs, the organs of sense and skin; while the female parent chiefly determines the internal structures and the general quality, mainly furnishing the vital organs, *i. e.*, the heart, lungs, glands, and digestive organs, and giving tone and character to the vital functions of secretions, nutrition, and growth.

The *mule* is the progeny of the male ass and the mare; the *hinny* that of the horse and the she ass. Both hybrids are the produce of the same set of animals. They differ widely, however, in their respective characters—the mule, in all that relates to its external character, having the distinctive features of the ass; the hinny, in the same respects, having all the distinctive features of the horse, while in all that relates to the internal organs and vital qualities, the mule partakes of the character of the horse, and the hinny of those of the ass.

In short, the mule is in its external appearance, a modified ass, and the hinny a modified horse. The male gives the locomotive organs, and the muscles are among these; the muscles are the organs which modulate the voice of the animal; the mule has the muscular structure of its sire, and brays; the hinny has the muscular structure of its sire, and neighs.

It is believed, however, by many, that the offspring is most likely to resemble that parent which had the greatest generative influence in the formation of the fetus; and it follows, therefore, that the most perfect animals, both male and female, should be selected and employed in propagation, there being no other certain means of establishing or preserving an eligible breed.

Influence of Confinement.—Professor AGASSIZ has suggested the question, whether we do not injure the vitality and vigor of our domestic animals by the common system under which "every male is made to be nothing but a breeding machine;" in other words, by keeping stallions and bulls shut up in stables in a sort of pampered luxury unfavorable to healthful development.

The *Country Gentleman* says: "In some countries of continental Europe, as our readers are aware, stallions and bulls are habitually worked in harness and in the yoke. In whatever other respects these animals may vary from the standard we desire to attain, it is our belief that in

healthful vigor, reproductive powers, and capacity of endurance, they afford an example we might seek to imitate with advantage."

This is, to say the least, plausible. We know that, among men, the most prolific and vigorous are those who work, not those who live in idleness. As they can not be properly controlled, it does not answer to let stallions and bulls run at large, in the pasture, with females; and as exercise and fresh air are absolutely essential to their good health and vigor, the best way to obtain these, and keep them in good condition is, to break the former, when quite young, to the harness as well as to the saddle, and the latter to the yoke, and work them regularly but moderately. This would also subdue their fierceness, and make them manageable and safe on a farm.

S. M. WELLS, of Wethersfield, Connecticut, and many of the best stock growers of New England oppose this view, and insist that confinement does not result in injury; so the question can be settled only by multiplied experiments.

A good-sized, well-fed yearling bull will get as many vigorous calves as he ever will; but it will be likely to weaken him, if he be permitted to serve more than half a dozen the first season. With such moderate use, his gets will almost certainly be strong and perfect, and he will develop more vigorously and rapidly,

Thorough-Breds.—It ought not to be necessary to say a word against breeding from native or even grade bulls. No intelligent farmer, who knows what is for his best interest, will think of admitting into his herd any but a thorough-bred bull of some good variety. A very great change has been wrought in this direction within ten years, and in some parts of the country, where stock raising has been wisely developed, it is properly regarded as a disgrace to permit the mongrelizing influence of a scrub bull. A good bull will frequently transmit great milking qualities inherited from his mother; indeed, if unusual milkers are chiefly sought for in the prospective heifers, the ancestry of the bull is as important as that of the cow.

"Such knowledge as has been gained by observation and experience," says Mr. GOODALE, in the article already freely quoted, "regarding the relative influence of the parents, teaches emphatically that every stock grower should, in the first place, use his utmost endeavor to obtain the services of the best sires; that is the best for the end and purposes in view; that he de-

pend chiefly on the sire for outward form and symmetry; and next, that he select dams best calculated to develop the good qualities of the male, depending chiefly upon these for freedom from internal disease, for hardihood, constitution, and generally for all qualities dependent upon the vital or nutritive system. The neglect which is too common, and especially in breeding horses, to the qualities of the dam, miserably old and inferior females being often employed, can not be too strongly censured." In rearing valuable horses the dams are not of less consequence than the sires, although their influence upon the progeny be not the same. This is well understood and practiced upon by the Arab, who cultivates endurance and bottom. If his mare be of the true Kocklani breed, he will part with her for no consideration whatever, while you can buy his stallion at a comparatively moderate price. The prevalent practice in England and America of cultivating speed in preference to other qualities, has led us to attach greater importance to the male, and the too common neglect of health, vigor, endurance, and constitution, in the mares has, in thousands of cases, entailed the loss of qualities not less valuable, and without which speed alone is of comparatively little worth.

"Breeding, as an art, in this country is in its infancy. A glimpse of the stature it may attain unto, is afforded us by the success attending the exhibition of the horses of Mr. TEN BROECK and the cattle of Mr. THORNE upon Britain's own soil, and in competition with the best of her own growth. We have the best material to begin with or to go on with which ever existed on the earth. We have a country for its development, which, in soil, in climate, in food, in freedom from diseases, and in other facilities, has no superior, and probably no equal in the world. Let scientific knowledge and practical skill take the place of prevalent ignorance and carelessness, and improvement must go rapidly forward, and accomplish almost incalculable results."

A Tax on Male Animals.—HON. GEORGE GEDDES, of Onondaga county, New York, recommends a national tax on all bulls, stallions etc., and says: "This would be one of the greatest steps ever made toward the improvement of agricultural stock; it would be more than a step—it would be an immense stride—for any man has only to stroll across country a few miles and see the wretched entire male animals kept on many farms, to be grieved sorely in mind at the idea of propagating

such miserable and valueless trash. If every horse colt not altered when a year old entailed a tax of \$20 per year upon his owner—if every bull calf of six months old had to pay \$5, and the same per annum afterward, and every ram lamb, and boar pig were taxable at \$2 per year, commencing at three months of age—it would exterminate most of the worthless brutes, and in five years time the live stock would be worth very many millions more, and in the course of a few generations there would be nothing living but had some good blood in it, for the dullest of farmers would not pay taxes on the hideous objects which now rove around. If some wealthy man would buy (for the trifle such ugly specimens would sell for) one or two and send them in all their deformity to the nearest agricultural show fair, the exhibition of these monstrosities might do much good, for it would cause great discussion as to others who made use of males no better, and so shame the owners that they might begin to see the folly of raising such unsightly and unprofitable animals."

This proposition seems worthy of immediate adoption. If there is any measure so simple as this, which can ameliorate our stock, by abolishing the wretched scrubs which still infest every county in the land, its practical working ought not to be postponed for a day.

Varieties of Cattle.—From the principle of selection, from the influence of climate, food, and care, and from many natural tendencies which are not well understood, have sprung varieties of each genus, more or less definitely marked, and bearing greater or less relative value. Of the genus ox, there are several kinds well-known in America, such as the Durham or Shorthorn, the Devon, the Ayrshire, the Jersey, or Alderney, the Dutch, etc., and a countless herd of natives, varying in quality up and down through the whole scale of merit.

There are three points of prime importance in determining the selection of a breed of cattle: dairy qualities, working qualities, and, finally, beefing qualities. Some breeds combine two of these in admirable completeness; none seems to concentrate them all in the highest perfection. The average Devon is probably superior to any other breed for the yoke; the average Alderney for richness of butter; and the average Durham for beef. Yet these points of superiority are subject to modification by many conditions. Firstly, there is the differ-

ence in value between cattle of the same breed. There are individuals, and even herds, in each of the above named divisions, that are superior in any given quality to the average of any other division. Secondly, there is the modification caused by climate and food. In some localities, States, even sections of our country, one variety will be found to be pre-eminently adapted to prevailing conditions, and will prove superior to any other for general propagation.

Points of a Good Cow.—The chief points which distinguish a prime dairy cow, and are at the same time compatible with an aptitude for fattening, are, a long and small head, a bright and placid eye, thin chops, small horns, neck thin toward the head, but thickening toward the shoulder; dewlap small. The breast neither immoderately wide (as is remarked in cattle with a great tendency to fatten) nor yet narrow, and projecting before the legs; the girth behind the shoulder deep, the ribs wide and gradually distending more and more toward the loins; there should be good breadth across the hips and loins; the thighs should be thin and the legs not too long and inclined to crookedness; the udder should be capacious, but thin and not too coarse and fleshy, and nearly of equal size, with moderate-sized teats equally distant from each other, and the milk vein large. The tail should be thick above and taper downward, and the skin fine and silky. Dr. ANDERSON gives the following rhythmical enumeration of the qualities of a good cow:

"She's long in her face, she's fine in her horn,
She'll quickly get fat without cake or corn;
She's clear in her jaws, she's full in her chine,
She's heavy in flank, and wide in her loin;
She's broad in her ribs, and long in her rump,
A straight and flat back, with never a hump;
She's wide in her hips, and calm in her eye,
She's firm in her shoulders, and thin in her thighs;
She's light in her neck, and small in her tail,
She's wide in her breast, and good at the pail;
She's fine in her bone and silky of skin,
She's a grazer's without, and a butcher's within."

In an essay in *Rural Affairs*, DONALD G. MITCHELL ("IK MARVEL"), says on this point: "First of all, the milk dairyman should abjure allegiance to any one strain of blood; it will never do for him to swear by the herd-book, or to have any hobby of race. Here and there, a Shorthorn (at a great price) proves a great milker; and there are individual Ayrshires who do wonders in the filling of a pail; the Alderneys, I think, never. Grade animals of good milking points will be serviceable ones for him; and if he keep his eye open,

as every shrewd farmer should, he will find here and there some rawboned, misshapen native animal, who will yield golden returns. Those animals that will give the most milk under generous feeding, without respect to name or lineage, are the animals for him. Therefore, in nine cases out of ten, the best milk herd is very motley in form and color. In an experience of some ten years, with a herd of twenty or more, the three most profitable milkers I have owned, have been a grade Shorthorn, (from Kentucky), a grade Ayrshire, and a rawboned native."

The only practicable means of generally improving the quality of stock, is to put none but thoroughbred bulls upon the best grades and native cows. Some extraordinary natives are reported from time to time. The cow of Mr. COLT, of Pittsfield, Massachusetts, produced one hundred and ninety-three pounds of butter during five months of Winter time. HOSEA MERRILL's cow, same town, yielded thirty beer quarts of milk per day. A native cow of THOMAS HODGES, of North Adams, made four hundred pounds of butter in nine months.

The Durham.—We place the Durham, or Shorthorn first, because there is no doubt that it is the development of more care, more skill, and more intelligence, as a uniform breed of cattle, than any other breed in the world. It is also much more bred from in this country than any other. The Durhams are pre-eminently superior for the beef market. They grow to a larger size than any other stock, and their beef is unsurpassed in weight, delicacy, and succulence.

They eat according to their size, and so they are regarded as difficult to keep on the hill-sides of New England, where the Ayrshire and Devon are preferred. In sections where the air is moist and the food abundant and rich, as in the blue-grass lawns and ranges of Kentucky, and on the native herbage of the prairies of the West, they are bred from more than all other breeds.

Their milking qualities are excellent, under favorable conditions; and they have the advantage of turning profitably to the shambles when needed no longer for the dairy. A cow that sells readily to the slaughter for seventy-five to one hundred dollars, will be preferred wherever food enough to keep her can be found; for every thriving farmer will look first to milk and next to capacity to take on flesh.

The Shorthorn cow is heavy; it is troublesome to her to travel; she requires thick grass

in fact, she wants to be "up to her knees in clover," and then she will pay most richly, both as a milker and for the butcher. But it would be the height of folly for a farmer who has only poor pastures to buy Shorthorns. In longevity, continuous breeding to an advanced age, and a final profitable termination of her career at the shambles, the Shorthorn has no equal.

The majestic size, proud carriage, and beautifully variegated colors of the Shorthorn render him easily recognized by the merest tyro; but few who thus admire and recognize him are aware how many qualifications go to make up this splendid whole, or how carefully each point has been weighed and discussed, and its relative value decided. The "high caste" Shorthorn should have a small head, a broad, flat forehead, with no projection of the frontal bones; the face should be well cut out below the eyes, tapering to a fine muzzle, with open nostrils; the nose must be flesh or chocolate colored; the eye must be bright, prominent, and yet placid; a small piggish eye is to be avoided; the horn should be well set on, and of a waxy, yellow color at the base; the body should be square, massive, and symmetrical, set on short legs, which should be straight and well under the animal; the fore legs should be small in the bone below the knee, while the forearm must be broad and tapering downward, fitting level into the girth; the hind legs must be nearly straight; if the hocks are too much bent, turned inward, or not well under the body, it not only gives an awkward gait in walking, but is generally a sign of weakness; the neck is moderately long, clean in the throat, and running neatly into the shoulders, which should not be too prominent at the points, nor too wide at the top; they should mold nicely into the fore-quarters, and be well covered with flesh on the outside; the neck vein should be well filled up with flesh, and form on smoothly to the shoulder points; the chest must be broad and deep, and full back of the elbows; the brisket should be full and broad rather than narrow and projecting. In the upper portion of the frame we must have width and thickness and length; the crops must fill up level with the shoulders and back; the ribs must spring level and full from the back, and fill well up to the hips.

The loin must be broad and well carried forward into the crops, and covered with thick flesh, molding nicely on to the hips, which though wide must not be too prominent, but

slope away gradually to the rump bones at the tail; the back must be level from neck to tail, with no drops back of the shoulders, nor any rise where the tail is set on; the rumps must be well laid up, but not too high; the twist should be well filled out in the "seam," wide and deep, the outside thigh full, the flank deep, and forming with the fore-flank and belly, a parallel line with the animal's back. The whole frame must be evenly covered with flesh, of a mellow elastic nature, readily yielding to the fingers, yet following them as the pressure is withdrawn; the skin must be of a moderate thickness, neither too thin nor thick enough to be stiff and hard; it must be covered with a coat of thick, soft, mossy hair.

As oxen, the Durhams are admirably adapted to heavy work. They are stronger than any other breed; just the oxen for quarries or any very hard, steady pulling; but they are mild, docile, slow, and are generally surpassed by the quicker Devon grades, at plowing, and all road traveling.

The Devon grade oxen take a large majority of premiums at the fairs where there is competition. They are almost as tall and long, much handsomer than the Durham, and more spirited. S. W. BARTLETT, of East Windsor, Connecticut, a Durham breeder, says: "There are some objections to Shorthorns not yet mentioned. Take a pair of high grade steers, and you will find that by the time they are four and a half or five years old you can not plow with them; they are so broad that the off ox can not walk in the furrow, and they also outgrow the road. I have seen cows with bags so large that it was difficult to drive them home from pasture. I owned a Shorthorn cow that was afterwards sold at auction in Canada for thirteen hundred dollars."

Of all descriptions of cattle, Shorthorn grades are now the most popular, where dairy business and fattening are carried on simultaneously. They are for the most part, admirable milkers; their calves, both heifers and bullocks, can be fed-off at an early age, and, coming to heavy weights, bring large and remunerative prices; while the cows themselves, when no longer useful for the dairy, are easily fattened, and can be quickly got rid of.

The Devon—The Devon is entitled to the next place, because it appears to have been the "first settler" of this country. The Devon head is handsome, and the color almost uniformly a bright red. They are now bred mainly for beef and work; more rarely for the

dairy, as their average yield of milk, though rich, is small. The Devon beef is very sweet, and is preferred at Smithfield market. C. L. FLINT, in his "Milch Cows and Dairy Farming," says: "The improved North Devon cow may be classed, in this respect, with the Hereford, neither of which have well-developed milk vessels—a point of the utmost consequence to the practical dairyman."

Though indigenous to a country possessing the mildest climate in Great Britain, this breed is remarkably hardy and vigorous, and thrives where more delicate animals would scarcely live. For general farm labor, no other breed in the world can equal the Devon oxen. They have great quickness of action average docility, and a stoutness and honesty of work to which few teams of horses can pretend.

For the production of beef of superior quality they are unsurpassed, even rivalling the little Highland Scot in the estimation of the London west-end butcher, whose fastidious customers oblige him to kill none but beef of the finest quality and flavor, and who may, therefore, be considered a good judge of excellence in this particular. The Devon does not, indeed, attain the great weight of some breeds, but their advocates claim, that on a given quantity of food, and in a given time, they will make as much beef as any of them. The flesh is of high character, being well marbled and mottled with fat and of fine grain. The weight of meat is laid on the choicest parts, the shoulder, side, and fore-flank being well covered with flesh; and, in addition, they have a peculiar property of furnishing meat of first-rate quality along their tops or backs. A well-bred Devon, in good condition, will always show flesh over the very backbone itself, thus, of necessity, securing a good thickness over the loin. It is this admirable distribution of flesh that distinguishes the Devon.

FRANCIS M. ROTCH, gives the following photograph of the Devon: "We will now try, in a few words, to describe the North Devon, as we have seen him in the show yard of the Royal Agricultural Society, the admired of all beholders, where even 'shorthorn' men confessed him a model of perfection. He has a small, lean head, a somewhat dishing face, a delicate light-colored nose, a bright, prominent eye, surrounded by an orange-colored ring, small, flexible ear, elegantly symmetrical horns, which have an upward tendency and are slightly turned out at the tips, a light neck, round, full bosom, and a deep chest, with a

good, full fore-flank; the shoulder sloping, without a coarse point, and rising slightly above the line of the back, forming, with the crest, a sloping line from the head, which adds much to the style and carriage; the crops are full, with no hollow or drop behind the shoulder, and molding nicely into the full, springing rib, which, with the last mentioned point (the crops) especially marks the well-bred Devon; the loin is broad, the hips wide, but not 'ragged,' and the quarter long and well filled up between the hip and rumps; these last should be well up, but here we find the point most liable to weakness in the whole form—they are frequently low, narrow, and joined with a crooked leg; but in our perfect specimen the rumps lie well up and are well covered with flesh; the bone is fine, and the cord of the tail long and slender, finishing with a full tassel of white hair. Our Devon is of a rich blood-red, with a tinge of golden light playing over his soft rippled coat; but the color varies from a decidedly yellow-red, to a mahogany color, though this last, when accompanied with a dark nose and almost black color about the head, is a very questionable hue for a true North Devon."

The Ayrshire.—This breed originated nearly a hundred years ago in Ayrshire, Scotland, and is the result of careful selection and crossing with good breeds already established, by which defects were removed and good qualities increased and rendered hereditary. The amelioration is supposed to have been assisted by skillful crossing with the Jersey and the old Teeswater—the latter also the foundation of the Durhams.

The following is the approved description of the Ayrshire: "Head small, but rather long and narrow at the muzzle; the eye small, but smart and lively; the horns small, clear, crooked, and their roots at considerable distance from each other; neck long and slender, tapering toward the head, with no loose skin below; shoulders thin; fore-quarters light; hind-quarters large; back straight, broad behind, the joints rather loose and open; carcass deep, and pelvis capacious, and wide over the hips, with round fleshy buttocks; tail long and small; legs small and short, with firm joints; udder capacious, broad and square, stretching forward, and neither fleshy, low hung, nor loose; the milk veins large and prominent; teats short, all pointing outward, and at considerable distance from each other; skin thin and loose; hair soft and wooly. The head,

bones, horns, and all parts of the least value, small; and the general figure compact and well proportioned. Compared with other improved breeds, the thighs, or what is called the twist of the Ayrshire cow, are thin. She is, characteristically, not a fleshy animal."

FLINT, in his treatise on milch cows and dairy farming, devotes considerable space to this breed, and concludes that for dairy purposes purely, or mainly, the Ayrshires deserve the first place. In consequence of the cow's small symmetrical and compact body, well-formed chest, and capacious stomach, there is little waste through the respiratory system; while, at the same time, there is a very complete assimilation of the food, and thus she converts a large proportion of her food into milk, and of a better quality than any other breed.

A Scotch account says: "The excellency of a dairy cow is estimated by the quantity and quality of her milk. The quantity yielded by the Ayrshire cow is, considering her size, very great. Five gallons daily, for two or three months after calving, may be considered as not more than an average quantity. Three gallons daily will be given for the next three months, and one gallon and a half during the succeeding four months. This would amount to more than eight hundred and fifty gallons; but allowing for some unproductive cows, six hundred gallons per year may be the average quantity annually from each cow.

"The quality of the milk is estimated by the quantity of butter or cheese that it will yield; three gallons and a half of milk to a pound of butter. An Ayrshire cow, therefore, may be reckoned to yield two hundred and fifty-seven pounds of butter per annum.

"When the calculation is formed, according to the quantity of cheese that is usually produced, the following will be the result: Twenty-eight gallons of milk, with the cream, will yield twenty-four pounds of sweet-milk cheese, or five hundred and fourteen pounds per annum."

The above Scotch estimates are probably somewhat above the average product of Ayrshire cows in this country; but it still remains true that, in proportion to their size and the food they consume, they are superior to all other cows as milkers. The WELLS brothers, of Connecticut, give, as a summary of their experience in buying and breeding for the pail, that two Ayrshires give as much milk as three Durhams or Devons, and that two Durhams eat as much as three Ayrshires.

The Ayrshire oxen, though smart and hardy, are generally too small to take a first rank. A cross with the Durham has been found effective in improving the quality. A cross obtained from an Ayrshire bull and a pure-bred Short-horn, produces a stock that for beauty and strength, for the milk-pail, and, at last, to take on fat readily, would be hard to beat.

The Alderney.—The cattle known as the Alderney originated on the small islands of Alderney, Jersey, and Guernsey, in the channel between England and France. These islands contain a thrifty population of six hundred to the square mile, and on every farm of eight acres there will be about five cows, three heifers, one horse, and three pigs. These farms are generally owned by the farmer, but when rented they fetch enormous prices, ranging from six to twenty-five dollars in gold per year per acre.

The cows of Alderney and Guernsey are now generally superseded by the superior race of Jerseys, refined from Norman stock. The cows have been long celebrated for the production of very rich milk and cream, but till within a quarter of a century they were comparatively coarse, ugly, and ill-shaped. Improvements have been very marked, but the form of the animal is still far from satisfying the eye.

The head of the pure Jersey is fine and tapering, the cheek small, the throat clean, the muzzle fine and encircled with a light stripe, the nostril high and open; the horns smooth, crumpled, not very thick at the base, tapering, and tipped with black; ears small and thin, deep orange color inside; eyes full and placid; neck straight and fine; chest broad and deep; barrel hooped, broad and deep, well-ribbed up; back straight from the withers to the hip, and from the top of the hip to the setting on of the tail; tail fine, at right angles with the back, and hanging down to the hocks; skin thin, light peculiar fawn color; and, elastic skin, covered with fine soft hair; fore legs short, straight and fine below the knee, arm swelling and full above; hind-quarters long and well filled; hind legs short and straight below the hocks, with bones rather fine, squarely placed, and not too close together; hoo's small; udder full in size, in line with the belly, extending well up behind; teats of medium size, squarely placed and wide apart, and milk veins very prominent. The color is generally cream, dun, or yellow, with more or less white, and the fine head and neck give the cows and heifers a

fawn-like appearance, and makes them objects of attraction in the park.

They were received with but little favor on their first appearance in this country—being regarded as delicate, requiring more care than other cattle, as small and mean, fit only for rich and “gentlemen farmers.” They have overcome these prejudices to a great extent, until it is generally acknowledged that an average herd of Jerseys will make more butter in a given time than the same number of average cows of any other breed, on the *same amount of food*; that the deeply-yellow, highly-flavored, waxy butter has a marrowy richness that is not equalled; and that it will pay every farmer who furnishes milk or butter for market, to keep at least one Jersey to every six cows for the purpose of flavoring and coloring the total yield. Their butter brings from five to fifteen cents more by the pound in Eastern markets than any other. Lieutenant-Governor E. T. HYDE, of Connecticut, stated that the butter was regarded by his family as too rich to be palatable, and Devon butter was used instead.

For poor pastures and hard Winters, they are not equal, as it is said by some breeders, to the Ayrshires or Devons. But TITUS OAKES, and other reputable breeders, affirm that no cow excels the Jersey in hardiness. They do not carry beef; they do not possess the symmetrical and rounded form that characterizes the Shorthorns and Devons, nor can they probably ever rival them for the yoke or shambles.

Jersey bulls are coming largely into use, as a means of adding to the butter-making capacity of other breeds—the Alderney and Ayrshire being a favorite cross.

Dutch cattle are of large size; prevailing color black, with sometimes a white patch over the back, resembling a sheet, and are, from this, distinguished by the name of sheeted cows. They are heavy milkers, but the milk is of rather poor quality, and not very productive of butter. Another very serious objection to Dutch cattle is the difficulty of fattening them when past their prime, and the large quantity of food they consume in the endeavor to prepare them for the butcher. On account of these two faults in the character of this, at one time rather popular breed, they have of late years been going down in public estimation.

The *Hereford* is another aboriginal stock of British cattle, that has long flourished by the side of the Devon. In earlier days, the characteristic white face, by which they are now recognized, was not a peculiar mark of the

Hereford. The first importation into this country was by HENRY CLAY, in 1817. In this breed, the face, mane, throat, the under portion of the body, the inside and lower part of the legs, and the tip of the tail, are beautifully white; the other parts of the body a rich red, usually darker in the male than the female; the horn is white or light yellow, of a waxy appearance, sometimes tipped with black; the forehead is broad, with spreading horns—those of the bull straight and level with the poll, and of the ox and cow slightly curved, with an upward tendency; the eye is full, yet passive, denoting the quietness of disposition and temper characteristic of the Hereford, and which is of paramount importance to insure the profitable feeding of all ruminating animals. This race has long been famous for its oxen and steers; they are very hardy, larger and stronger than the Devon, and docile as the Shorthorn. The Hereford cow makes slight pretensions as a milker, and is seldom selected for the dairy.

The *Brittany* cows are a small, tough breed, capable of enduring all hardships and living on little, while yielding well in milk and butter. Professor W. H. BREWER says: “They are noted throughout France for their milking qualities. They are even smaller than the Jersey, but more hardy, yield similarly rich milk, and thrive well on poor soils. Cows of this breed are cited, which on their native hills, pastured on the scanty feed of the region, yield eight times their weight of milk per year. They are a breed for poor lands, and thrive where other breeds fail.”

Mr. FLINT says of this breed: “Standing only about three feet high on their legs, the most fashionable height; mostly black and white—now and then, but rarely, a red and white; they are as docile as kittens, and look pretty enough to become the kitchen pet of the hard-pressed mountain or hill-side farmer, with pastures too short for a grosser animal. Ten pounds of hay will suffice for their limited wants for twenty-four hours.”

What is a Good Cow?—This question has already been inferentially answered. The *best* cow would be she that produced the most and richest milk on the least feed, while her male calves made the best oxen, and her carcass at last the most profitable beef. These qualities can assuredly be bred in and rendered hereditary by careful selection, to a far greater extent than is now dreamed of. The milch cows and beeves of 1970 will doubtless

contrast with ours more widely than ours do with the small stock that preceded BAKEWELL.

And it should be remembered that a cow which will give twice as much milk and make twice as much butter as another, is worth more than twice as much money as a cow because she will not eat twice as much food, nor require twice as much care.

JOHN T. NORTON, of Farmington, Connecticut, says of the product of the Jerseys: "This milk will make about one pound of butter from six quarts of milk. One pound from twelve quarts is not far from the average yield from other herds." Another writes: "They are not deep milkers, seldom giving over twenty-five to thirty-two pounds of milk per day. We had one which we sold to the Rev. HENRY WARD BEECHER, that gave forty and a half pounds of milk per day. As that gentleman justly observed, 'the Jerseys did not give much milk, but what they did give was all cream.' The most butter per week we ever had a Jersey cow give was sixteen pounds."

A well known breeder says: "The Durhams and Devons, as a rule, only yield well for a short time, during the most favorable period of their milking; while the Jersey will keep her yield well up during the whole season; and if extra care and pains are not taken, she will not dry off before she calves again, which is not to be desired, and is injurious to both cow and calf." J. M. MORSE, of Massachusetts, says of a Jersey: "We made from her in the month of June, sixty-five pounds of butter, besides using some milk. Her yield of milk per day was about seventeen quarts."

THOMAS FITCH, of New London, Connecticut, says: "I have a Jersey cow with a strain of Ayrshire in her that has produced in seven days, on good pasture and no other feed, sixteen pounds seven ounces of splendid butter, besides supplying the family of five persons with milk sufficient for tea, coffee, etc." Mr. BEACH, of West Hartford, Connecticut, reports in the *Country Gentleman*, that he has a Jersey cow that made ten pounds of butter in the first week of February.

Mr. FLINT, in his work on "Milch Cows," says: "A cross obtained from an Ayrshire bull of good size, and a pure bred Shorthorn cow, will produce a stock which it will be hard to beat at the pail, especially if the cow belong to any of the families of Shorthorns which have been bred with reference to their milking qualities, as some of them have. I have taken great pains to inquire of dairymen as to the

breed or grade of their best cows, and what they consider the best cows for milk for their purposes, and the answer has almost invariably been, the Ayrshire and the native."

The Jersey cow, "Flora," made no less than "five hundred and eleven pounds of butter in one year, without extra feeding;" and J. C. CONVERSE, of Massachusetts, affirms that his Jersey cow, "Fanny Milton," produced fifteen hundred and ninety-five quarts of milk, and two hundred and twenty pounds of butter in three months, from grass in pasture only.

J. BODICE, a Scotchman, writes to the *Genessee Farmer*: "I have carried on a dairy in Ayrshire, Scotland, for twenty-five years, and always considered the Ayrshire cow the best that could be obtained—milking qualities considered. Our best Ayrshire cows yielded thirty-six quarts per day, on pasture alone, and our poorest, twenty-four quarts per day during June and July."

JOSEPH H. HOWE, a well-known dairy feeder of Massachusetts, gives the monthly yield of an Ayrshire cow, that gave in one year five thousand two hundred and sixty-five quarts of milk. "The keeping consisted of a few roots or shorts, with as much hay and other fodder as she would eat—during the Summer months, nothing but good pasture." The Ayrshire cow, Dolly, owned by S. M. WELLS, of Connecticut, has given five thousand quarts a year. YOUTT estimated a fair annual average for an Ayrshire cow at six hundred gallons. AITON thinks it approaches a thousand.

The great value of Alderney stock is that it is almost indispensable in crossing for the production of the most valuable and highest type of the cow for rich and poor, family and dairy. A high-grade Alderney never gives poor milk.

Hon. H. INGALS, of Mercer, Maine, is reported to have had a cow, half Durham and half native breed, that gave in June 353 pounds of milk per week, and whole weight of butter first week, 19 pounds; weight of milk the second week, 367 pounds; weight of butter second week, 21 pounds, making 40 pounds 10 ounces of butter in 14 days, requiring 18 pounds of milk to one of butter.

S. SCAMMON, of Stratham, New Hampshire, reported in the *Country Gentleman*, that he has an Ayrshire cow which made, in one year (when she was six), by accurate weight, six hundred and ten pounds of butter. Her milk weighed fourteen thousand five hundred and forty pounds—more than seven tons—the average being almost forty pounds of milk per day,

and twelve pounds of butter per week, during the year. Mr. SCAMMON gave his cow "good hay, and generally two quarts of meal per day." In the Summer, he gave her four quarts of meal per day, till July, then decreased to two quarts, and, after haying, turned her out to grass, and gave no meal;" gave her "green stalks in the season of them." He says his two daughters milk this cow, "one on each side of her, with a large pail apiece!" Would sell her "for \$1,000," and nothing less.

To Ascertain the Age of Cattle.—

The ordinary guide for ascertaining the precise age of cattle is the horn. At three years old, the first distinct ring is usually observed; at four years old, two are seen; and so on, one being added on each succeeding year. Hence the rule, that, if two be added to the number of rings, the age of the animal would be given. These rings, however, are perfectly distinct in the cow only; in the ox they do not appear until he is five years old, and are often confused: in the bull they are either not seen until five, or can not be traced at all. They are not always distinct even in the cow.

Far surer signs are presented by the teeth. Generally, if the mother have gone the average period of gestation, the calf will show two central teeth on each gum at birth; two weeks after, a tooth will be added on each side—making eight in all—and in a month this number will be doubled. The number and appearance of the front or incisor teeth, at subsequent periods, are indicated by YOUTT in the following cuts:



SIX TO EIGHT MONTHS.



TWELVE MONTHS.



EIGHTEEN MONTHS.



TWO YEARS.



THREE YEARS.



FIVE YEARS.



TEN YEARS.

Mr. HICKEY says: "The age is indicated with unerring certainty by the teeth, to those who have judgment and experience, until the animal reaches the age of six or seven; until two years old, no teeth are cast; at that age, two new teeth are cut; at three, two more are cut; and, in the two succeeding years, two in each year; at five the mouth is said to be full, though not completely so until six, because until that period the two corner teeth (the last in renewal) are not perfectly up. The front or incisor teeth are those considered, for a full-grown beast has thirty-two teeth" (eight incisor and eight molar teeth on each jaw).

An Infallible Sign of a Good

Cow.—Is there an "infallible sign" by which alone to judge accurately of the quantity and quality of a cow's milk and butter? Yes; if we may rely upon the discovery of M. FRANCIS GUENON, for which he has received a pension of three thousand francs a year from the French government. The sign which he and his official patrons declared to be infallible, and which is now observed and studied with care by every intelligent breeder in this country as well as in Europe, is the Milk Mirror, as M. GUENON called the escutcheon, formed by the lines on the back part of the udder and thighs of a cow, where the growth of hair changes its direction.

The importance of this theory is fully recognized by Mr. FLINT, and by most of the stock authorities of this country; JOHN S. SKINNER asked in his introduction to GUENON's work: "Is it extraordinary or incredible that the milky secretions of the cow should produce, in the region where the process is carried on, and where her characteristic excellence lies, external effects not more visible or striking than are produced on the size, color, and growth of the hair, on the shoulders, neck, and head of a bull?"

GUENON's claims attracted the attention of French Agricultural Societies as early as 1837, and the Bordeaux society, after putting him to severe tests, reported favorably. We extract briefly from their report: "M. GUENON has established a natural method, by means of which it is easy to recognize and class the dif-

ferent kinds of milch cows. By means of this classification, which is no less clear and distinct than simple, we are enabled,

1. To distinguish with ease, in any herd of cows, each individual comprised in it, according to the quantity of milk which she is capable of yielding—from twenty-six quarts a day down to next to nothing, and all intermediate quantities.

2. To know the qualities of the milk which each will give, as being creamy or serous.

3. To determine during what time, after being got with calf, the cow will continue to give milk.

"We have examined, in the most careful manner, upward of sixty cows and heifers; and we are bound to declare that every statement made by M. GUENON with respect to each of them, whether it regarded the quantity of milk, or the time during which the cow continued to give milk after being got with calf, or, finally, the quality of the milk as being more or less creamy or serous, was confirmed, and its accuracy fully established.

"After more than twenty years of observations and researches, M. GUENON has succeeded at length in discovering certain natural and positive signs, which constitute the basis of his method; a method henceforward proof against all error. * * * This system, gentlemen, we do not hesitate to say it, is *infallible*. The signs upon which it is founded, ever constant, invariable in the place they occupy, are strongly impressed upon the animal by the hand of nature. To appreciate them becomes an easy task."

GUENON applied his system with equal confidence to young animals, deciding on the future milking qualities of calves. The marks from which he judged are now well known among farmers, visible on the posterior parts of a cow, in the space between the udder and the vulva. The escutcheon is bounded by the lines where the different growths of hair meet.

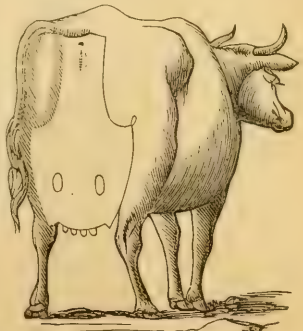
All breeds of cows are divided by GUENON, into eight classes, according to the shape of the escutcheon belonging to the class, and the higher orders of each class are found among the best cows of every country. According to the order of a cow is her yield of milk; if she be a large and constant milker her peculiar escutcheon will be large, regular, and free from blemish; as the milking capacity degenerates, the escutcheon becomes diminished and its outline indefinite.

We present for the reader's inspection and study, an illustration of GUENON's mirror, in the escutcheons of the eight different classes, retaining the arbitrary names which he adopted.

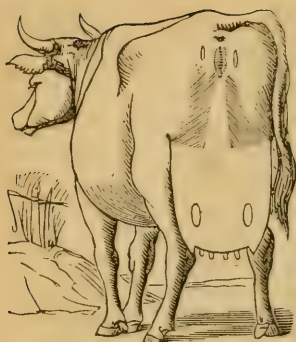
It is not necessary to illustrate the eight orders of merit into which GUENON divided each of the eight classes. We merely repeat that from the first order in each class, as here represented, the inferior orders descend in regular gradation, until the escutcheon almost entirely loses its distinctive character, or "runs out."

It is only necessary to add that the kinds of escutcheon are deemed valuable, in the order in which they are named—the Flanders being the best, and the Horizontal the least desirable. The best cows with the Flanders escutcheon yield, according to GUENON, when in the height of flow, an average of about twenty quarts a day. This average diminishes, not only downward through the different orders of the same class, but also through the different classes—the best of the Horizontal escutcheon cows yielding only twelve quarts daily in their flow. We omit engravings of two of the classes—the Square and the Limousine escutcheon—because they seem to us to be merely variations of the Demijohn.

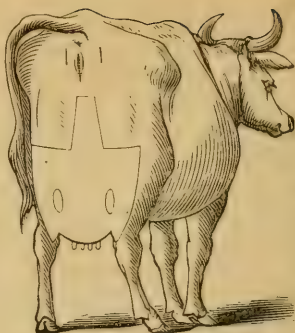
Cows of the first order of each class are known by their having a delicate udder, covered with a fine downy hair growing upward from between the four teats. This downy growth continues over the hinder part of the udder, and the region above it, blending with a similar upward growth, which, beginning on the legs a little above the hock joint, covers the inner surface of the thighs, encroaching upon the outer surface to points on either side, and then suddenly contracting as it extends upward. The skin of the inner surface of the thighs and adjacent parts, up to the vulva, is of a yellowish color, with here and there a black spot. A sort of bran or dandruff detaches from it.



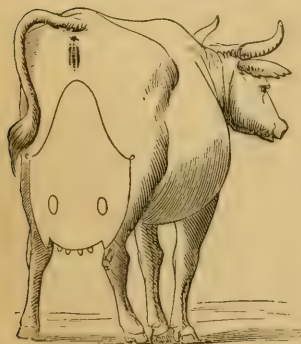
CLASS I.—FLANDERS ESCUTCHEON.



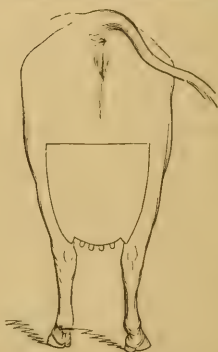
CLASS 2—SELVAGE ESCUTCHEON.



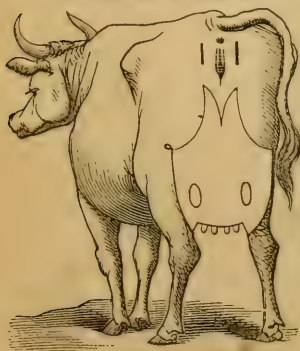
CLASS 5—DEMI-JOHN ESCUTCHEON.



CLASS 3—CURVELINE ESCUTCHEON.



CLASS 6—HORIZONTAL ESCUTCHEON.



CLASS 4—BICORN ESCUTCHEON.

In most of the higher orders of cows above described, we find above the two hind teats two small oval marks, about an inch and a half wide by two inches long, formed by hair growing downward in the field of ascending hair. There are also, very often, two tufts of ascending hair alongside the vulva, "indicating a prolonged continuance of the flow of milk as the time of calving approaches." Mr. FLINT calls attention to the fact that "in a fat cow, with an inflated udder, the mirror appears larger than it really is; while in a lean cow, with a loose and wrinkled udder, it appears smaller."

He adds that the mirror depends somewhat on the breed, and he does "not believe that precisely the same size and formed milk-mirrors on a Hereford or a Devon, and an Ayrshire or native, will indicate anything like the

same or equal milking properties. It will not do, in my opinion," he continues, "to disregard the general and well-known characteristics of the breed, and rely wholly on the milk mirror."

A correspondent of COLMAN'S *Rural World* thinks GUENON'S mirror valuable, but by no means infallible, adding:

"I saw, two years ago, a three-fourths Alderney heifer calf, of extraordinary beauty; I offered the owner twenty dollars for it at two weeks old. I turned it out to pasture without other feed; it has done well, and now has a heifer calf and is the most symmetrical young milch cow I ever owned—and what is better, the best milker. She requires to be milked three times a day although the calf runs with her. This heifer has not the GUENON escutcheon. Three weeks before coming in, her udder was not bigger than that of a goat; now she can scarcely get about, owing to her legs being so distended by her udder. I have another three-fourths Alderney, a very superior butter cow; neither she nor any of her progenitors had the GUENON escutcheon. Now, I think those purchasing cows for the dairy should not reject one that has not the escutcheon marks."

Spaying Cows.—To spay is to castrate, or remove the ovaries of a female animal, a process which incapacitates her for reproduction, and greatly diminishes the fervor of her periodical heats. It was first practiced on cows by Mr. WINN, an American, but has been most popularized in France. In that country, milch cows are subjected to it, even when they are not intended for the shambles in years.

Advantages of Spaying.—M. LEVRAT claims that spaying "causes a more abundant and constant supply of milk, an improvement of its quality, the certainty of a uniform flow, exemption from the perils of receiving the bull and delivering the calf, and, finally, greater facility of taking on fat when the milk fails, and a flesh that is more tender and juicy than that of an ox."

The best age for spaying is six; after-dropping the third or fourth calf. M. MORIN, says: "The cow spayed thirty or forty days after calving, and at the time when she gives the largest quantity of milk, continues to give the like quantity, if not during her whole life-time, at least during many years, and at the time when the milk begins to dry up the animal fattens. We are able to add, moreover, at this day, certain facts, the result of many years' experiment, that the milk of the spayed cow,

although as abundant, and sometimes more so, than before the operation, is of a superior quality to that from a cow not spayed; that it is uniform in its character, that it is richer, consequently more buttery, and that the butter is always of a golden color. We believe that we ought to remark in passing, that if we feed the spayed cow too abundantly, lactation diminishes and the beast promptly fattens. It is, therefore, important that the feeding should not be more than sufficient to enable us to obtain the desired result."

Spaying is chiefly valuable as applied to: 1, Small or decrepit cows; 2, those which though fine in appearance and good milkers, calve badly; 3, those subject to miscarriage; 4, those which calve with difficulty; 5, those that are always in heat; 6, those that for any reason it is not desirable to keep.

Prof. McCLURE recently published a treatise on this subject, in which he set forth that "spayed cows are less liable to prevailing diseases, and when sick are more easy of cure; they are always in condition and fit for the butcher and when pleuro-pneumonia is among them they can be sold without loss; they give the same quantity and quality of milk the year 'round, if they are properly fed and cared for. *Ten spayed cows will give the year 'round as much milk as double the number of cows not spayed, thus saving the interest on the outlay in the purchase and feed of ten cows.*"

Disadvantages of Spaying.—The disadvantages of the operation are summed up as follows: 1. The risk of death to the animal under the operation will be about one in a hundred—less than in the castration of bulls. 2. Spayed cows are apt to accumulate fat and flesh, so that they will become dry much sooner than cows not spayed. Still there can be little loss in this, for a fat cow is always ready for sale. 3. The expense of the operation will be from \$3 to \$5, which will depend upon the distance the operator has to travel, and how many animals are to be operated upon.

The ovaries are attached near the backbone. We shall not describe the process of removing them. Until spaying becomes more common in this country, the veterinary surgeon, or the neighborhood "horse doctor" must be relied on.

Weight of Beeves.—The net weight is from fifty to sixty-eight pounds to one hundred pounds of live weight, according to the condition of the animal, and according to the inclusion or exclusion of the hide and fat from the

calculation. The largest ox ever killed in America, whose weight is verified, was a Massachusetts Durham grade ox, eight years old, fattened by JOHN SANDERSON, of Bernardstown, in 1862. His live weight was 3,600; his net weight 2,473, after shrinking a week. He girted back of shoulders ten feet eight inches; forward of hips, eleven feet eight inches; height, six feet three inches; length, nine feet eight inches. A Connecticut ox, presented to WASHINGTON, weighed on the hoof 3,500; and several oxen have been killed in this country whose live weight was more than 3,300. The Iowa *Homestead* tells us of a white steer, belonging to SAMUEL H. JONES, of Sangamon county, Illinois, that girted ten feet six inches and weighed 3,600. Excursion parties visited it from different parts of the State. The average weight of our cattle increases every decade, and it can not be long before a four thousand pound ox will be grown.

The Cattle Market.—No other country in the world consumes so much meat as America, *per capita*; for in no other country is it so easy for the common people to earn a living, and to live well.

Something like two million head of cattle, including sheep and swine, are received every year at the New York shambles, and of this number much more than one-half are swine. The total value in 1863 was over \$30,000,000.

In 1863, 210,384 bullocks were sold in the New York market. Almost all of them came from the West, and six States furnished proportionately as follows: Illinois, nominally 118,692—though many of these were raised in Iowa, Wisconsin, and Kansas; Indiana, 14,232; Ohio, 19,269; Michigan, 9,074; Kentucky, 6,782; New York, 28,985.

Cruelty in Transportation.—SOLON ROBINSON speaks in his "Facts for Farmers" of the shocking cruelty that is often displayed in the confinement of cattle, without food or water, during long journeys, and makes the following humane suggestions: "We must have an improvement in cattle-cars. It certainly would not be difficult to construct them so that cattle should stand with heads to one side, where water could be given them in a trough, by means of a hose; and if this can not be done, it must be made a criminal offense to keep the animals on a car more than thirty hours without water. In fact, it would be better for all parties if the number that a car

should contain were limited (by law), and if the stock in no case could remain on the cars over thirty hours without being unloaded, rested, fed, and watered." The philanthropist, Mr. BERGH, is also urging the same much needed reform. The attention of legislators is invited to the shameful abuses which now prevail.

Working Oxen.—The Egyptians worshipped the ox for his services as a laborer. In New England he still holds the first place as the farm laborer; but in the West he is largely superseded by the quicker horse. The tendency to dispense with oxen is likely to be carried too far. They are most useful in all heavy operations, and every farmer with a hundred acres of arable land can keep one pair to great advantage, as an auxiliary to the horse team. Progressive farming commands deep, rather than wide, culture, and the ox will be found useful here until steam shall be advantageously harnessed to the implements of tillage.

In a good working ox we want to see the following qualities: Let him have large nostrils, a long face, a bright hazel eye; which will indicate docility and intelligence; a hoof rather long, and not turned outward very much; a straight back, a broad breast, wide gambrel, small tail, and horns of medium size. When you find such an ox as that, he will be a good worker.

Remember that oxen are not deaf. Don't bellow at them. Don't flourish around them, and yell like an Indian, when you wish to direct their motions. By this folly you exasperate yourself, confuse the team, and disturb the neighbors. The ox is one of the most tractable of beasts; and the best driver we ever saw was a boy, who addressed his oxen in a low tone, and never struck them. They obeyed his voice and gesture, as horses obey the rein.

Breaking Steers.—Some hard tussling is generally involved in breaking a pair of wild, vigorous three-year-olds. JOHN Y. SMITH thus advises in the *Western Farmer*: "Take two animals of about equal size and strength, and tie them together with a strong rope, by placing one end around the horns of one animal and the other end around the horns of the other, and make them fast, as for leading or tying up, leaving three or four feet of rope between the inner horns, and turn them into a field free from trees. Let them run and pull and haul till they are tired of it, and they will walk side

byside and feed together. Then take off the rope and they will ever after lead with the docility of a child, even though the first occasion may be years afterwards. It is much easier than for a man to be jerked around all day by a wild heifer or steer, and more effectual. We have tried it, and know."

A better way is to break steers to the yoke while calves and accustom them to the word of command. All animals, male and female, intended either for breeding, milk or work, should be thoroughly domesticated and taught to "handle well" and have no fear of man.

It is one of the first essentials in early training to bring the animal to depend upon the driver. Food, water, care, and training should be mainly given by one person. A feeling of dependence as opposed to independence should be cultivated. There should also be a strong friendship, a familiar acquaintance, and the fullest confidence of the animal. The labor is half accomplished when the animal has confidence in and a thorough acquaintance with the driver.

W. H. GARDNER says: "No demand should ever be made of a young animal with which he can not readily comply. It is a good rule to so direct that the easiest way to move is in the very direction you want the movement made. Any and all demands made must be enforced. The trainer never suffers in the estimation of the animal when he succeeds, even if force be necessary to effect the wished-for result. It is probably necessary to teach all working animals a wholesome fear of the whip. This done, its further use is seldom necessary. The whip should not be used in urging to higher speed. The best of all gaits is a quick, nimble walk. Train all teams to walk well."

"Young steers should not be cosseted and handled more than is necessary to keep them familiar with their master; more petting than this is apt to make them a slow, plodding pair of oxen. When too domestic, they lose spirit." They should seldom be worked with old oxen; it will restrain their lively walk, and give them slow and plodding habits.

Management of Cows.—We append a few simple rules for the general management of cows:

Heifers designed for the dairy can hardly be fondled or petted too much. The calf should be made familiar with her owner's presence and touch, until she becomes fond of him and follows him about the yard, courting his atten-

tions. Her bag should be handled occasionally before calving. Treatment of this kind will keep her in hand, and by the time she comes to milk, after the first few manipulations, she will be as gentle and steady as an old cow.

Never buy a cow of a dairyman; if he is a good manager he will sell only his poor stock.

As a rule, cows should be run dry four to six weeks before calving. If milked closely before calving, the calves will be poorer. This, however, depends much on the cows; some will give good milk without harm up to nearly the time of calving.

To determine which cows are best for keeping, try their milk separately, and weigh the butter—for sometimes a cow may give much milk and little butter, and *vice versa*.

Heifers dried up too early before calving will always run dry in after years about the same time; therefore be careful to milk closely the first year until about six weeks before coming in.

Spring cows should come in while they are yet fed on hay, and before they are turned to grass, which will be more likely to prevent caked bag and milk fever.

Cows should generally be fattened before they are fifteen. While the value of the udder in a good dairy cow exceeds the value of the cow, her pasture, and the necessary attendance, she may be kept to any age. A dairyman should raise two or three calves a year to every fifteen cows, to restore the losses.

For a milker we would have the heifer come in at two years old, and if she has been well kept, so as to have attained a good size, she is then old enough to become a cow. She will give more milk for coming in early.

A large pasture field for cows in milk is detrimental to quality of milk; the cow that gets her fill in a short time, and then lies down to ruminate quietly, will do much better than the same one required to spend a much longer time in obtaining the same amount of food.

Kicking Cows.—Cattle differ in natural dispositions as widely as their masters do. Some are nervous and irritable; others calm and docile. But nine cases in ten, bad habits in cattle result from the bad treatment of calves. If a cow have acquired a habit of kicking furiously whenever the milker approaches, the best cure is the butcher. If too valuable to spare, she can be restrained by elevating her nose with a strap tied to a beam overhead; or by passing a buckled strap over one of her bent fore legs. Simply tying the ears together has been found a preventive, by diverting the

attention. Scolding, fretting, loud threatening, thumping, and flagellations, are silly, as well as useless. A kicking man is worse than a kicking cow.

"If a cow or heifer persist in kicking under kind treatment, take a small rope, and quietly fasten it around the opposite fore foot, and thence bring it over her back so as to hang by the milker. When she kicks again, without saying a word, draw her foot up to her body. You can now handle her as you please. She will struggle to release her foot, but to no purpose, and will soon crouch to the floor. Then let her get up again, and pet her a little. If she kicks again, repeat the operation as often, and you will soon find she will not move a foot while you are milking, unless there is some irritating cause, like sore teats or sharp finger nails."

Milking.—In the first place, a cow giving milk should have all the good feed she will consume, Summer and Winter, with a suitable allowance of pure clean water to drink, and good comfortable stables during Winter, with access to shelter in inclement weather during Summer and Fall; should be milked at regular stated intervals, by the same milker, who shall perform the milking in the least possible time to do it thoroughly; and in a dairy of several cows, in regular succession—that is, the same cows follow each other in being milked, in regular course at each milking; and whatever feeding, or other caring for there is, should be done in the same regular, orderly course. Cows in milk, as well as all other stock, and they in particular, should have salt where they can have constant access to it—not only for their health, but for the quality and quantity of milk, and to keep up a constant flow.

Milk as fast as possible. Experience proves this to be the best way. Talk as little as possible while milking. Let the cow be perfectly quiet and contented. Milk at regular hours; let those hours be nearly or quite equidistant—say twelve hours between each milking. Then there will be no straining of the bag by overdistension.

Milk clean. To leave milk in the udder tends to dry up the cow. A French agricultural writer states, also, that, from recent experiments, it appears that the last milk drawn from the cow contains *ten times* more cream and butter than the first milk. Hence it follows that if, after drawing, say some seven or eight quarts of milk from the cow, the operation should be

stopped, and a pint or more left in the dugs, near one-half the cream and butter are lost.

Yet it is best always to milk with a full hand. Never strip with the fingers. Many a good cow has been spoiled by stripping. Milk firmly with the whole hand, and the cow will soon learn to drop all her milk within the time allotted to her. The teats and bag ought to be washed clean before milking.

Hard Milkers.—Cows generally milk hard because the orifice of the teat is too contracted. A correspondent of the *New England Homestead* states that he had a valuable young cow that milked so hard from the hind teats as to make the operation slow and very fatiguing to the milker. He adds: "By the aid of a probe I ascertained that the obstruction was at the lower end of the teats; I therefore thought that a little surgical skill might remove the evil. I took a narrow-bladed knife, gave it a keen edge, took the teat in my left hand, inserted the point very gently to the milk passage, and then, without fear or trembling, gave a sudden thrust of the knife in the right direction, and the cure was effected. The cow started a little, and then stood still. A few drops of blood followed the cut only. I then operated on the other teat with the same result. Another young cow, that came of the above-mentioned, had lost one-quarter of her bag, and milked so hard from one teat that the stream of milk was no larger than a small knitting-needle. With the same success I operated upon that."

To Make Cows "Give Down."—A timely taste of salt, or sometimes of meal or roots, will make a cow yield her milk. JOHN JOHNSTON says sour milk is better. "As the cow stops drinking she will give down freely."

To Prevent Leakage.—Some cows have a habit of shedding their milk in the pasture and yard, between milkings. There is an article called collodion, or liquid cuticle, which may be obtained of druggists. Apply this to the end of the affected teats after milking the cow. It at once forms a thin tough skin, and closes the orifice. At the next milking, this skin can be broken through, and after milking the collodion is again applied. After a few applications in this way, the defect will be permanently cured.

Another useful purpose of this article may be mentioned. Cow's teats often become tender from chaps and deep fissures in them. They may readily be cured by moistening a piece of muslin in this fluid, and applying it smoothly to the parts affected. It adheres so firmly that

it will not be loosened, even if the calf is allowed to draw the milk.

Cows Sucking Themselves.—Some try a yoke, and others a shingle on the nose as a preventive of this bad habit; and another uses "an old bridle with the bit in her mouth." W. S., in the *Prairie Farmer*, recommends the following remedy: "Mix cayenne pepper with lard, as strong as you please, the stronger the better, and after milking, grease the teats and lower part of the bag with the compound, and repeat the application until she forgets the habit, which will not be long. The pepper is so unpalatable that she will not try it many times."

To Prevent Cattle from Jumping.—"A Soldier Boy" writes that he has always succeeded in curing cattle of the habit of jumping by piercing the ears of the unruly animal, and tying them together over the head with twine. "The philosophy of it is that an animal always drops its ears when about to jump. When this is prevented, the jumping is abandoned."

A Western farmer says he makes it a rule that whenever cattle are made to pass a fence, whether through bars or "slip-gap," to leave one rail for them to pass under. This gives them a downward tendency, and lessens their inclination to jump or look upward, as they are sure to do when a lazy attendant throws down a part of the rails, and makes them vault the rest.

The habit of breaching is generally acquired through the negligence of the owner. When the habit has become fixed, the slaughter-house is the only cure. The poke, and all mechanical contrivances about the face, are deformities, and ought seldom to be resorted to.

Calves.—YOUATT says: "Parturition having been accomplished, the cow should be left quietly with the calf; the licking and cleaning of which, and the eating of the placenta, if it is soon discharged, will employ and amuse her. It is a cruel thing to separate the mother from the young so soon; the cow will pine, and will be deprived of that medicine which Nature designed for her in the moisture which hangs about the calf, and even in the placenta itself; and the calf will lose that gentle friction and motion which help to give it the immediate use of all its limbs, and which increases the languid circulation of the blood, and produces a genial warmth in the half-exhausted and chilled little animal. A warm mash should be put be-

fore her, and warm gruel, or water from which some of the coldness has been taken off. Two or three hours afterward, it will be prudent to give an aperient drink, consisting of a pound of Epsom salts and two drachms of ginger. This may tend to prevent milk fever and garget in the udder."

W. H. WHITE, of East Windsor, Connecticut, says: "The best way to raise calves, is to take them from the cow as soon as dropped; if possible, never let them suck, as they learn to eat or drink sooner, and there is no sore teat from biting, and the task of weaning the cow from the calf is soon over."

A writer in the *Germantown Telegraph* presents his method as follows: "A calf that I am going to raise I never let suck the cow. It is much easier to learn it to drink without than after sucking. I have had calves drink alone before they were twelve hours old, and after the second day, have but little trouble with them, as they drink freely if in good health. Besides the great advantage of this is, that when they are turned out with the cows they never trouble them. For the first two weeks I give them milk drawn from the mother; after the cud comes, then I scald a little bran or ground oats and corn, cake meal, etc. This mixture I have about milk warm, feeding them three times a day, making fresh each time, as they do not relish stale food. They will soon eat a little hay; clover is best. If there is grass, I tie them out for a short time, and in six weeks may be left to run, and the slop is gradually slacked off. I consider March the best time to start calves, as in April they can get a little grass, and by the following Winter they have a good beginning."

The *Massachusetts Plowman* says that when a calf is fed with milk by hand, it ought to be fed three or four times a day, slowly, as it would get it from suckling, otherwise instead of going to the fourth stomach, where it would go naturally from the cow's udder, it will be liable to fall into the rumen, paunch, or first stomach, and cause a derangement of the digestive organs. Professor TANNER says the best breeders in England give their calves liquid food, at least eight or ten weeks.

A calf will thrive better on milk that is not rich in butter than on what is commonly called rich milk; because the nutritious elements of milk reside chiefly in the casein.

The *Irish Farmers' Gazette* gives the following: "The best substitute for milk for such a purpose is a compound of three quarts of lin-

seed meal, and four quarts of bean meal, mixed with thirty quarts of boiling water, and left to digest for twenty-four hours, when it is poured into a boiler on the fire having thirty-one quarts of boiling water. Let it boil for half an hour, keeping it constantly stirred with a perforated paddle to prevent lumps and to produce perfect incorporation. It is then put to cool for use, and given blood warm. When first used it must be given mixed with the milk in small quantity, and increased gradually; decreasing the milk in the same proportion till they get the above mucilage only." This suggestion has been followed with great success by some farmers in Great Britain and Ireland.

Cotton-seed meal, though a third richer, is similarly used, and with the happiest results. A few have reported the death of calves from feeding it; but it was undoubtedly the result of over-feeding. Calves are very fond of it; and it must be given in very limited quantities.

It is bad practice to leave calves and colts to take their chances among older cattle. The older ones will get the best picking, while they need it least. They will select the best shelter and the warmest beds for themselves, and leave the little ones to take the chances that are left.

Calves well fed and taken care of, with a quart or two of meal daily in Winter, will be double the size at two years they would have attained by common treatment.

Oat-meal gruel, corn meal, sliced sugar beets, and boiled potatoes, are much used as food for a growing calf.

The Scours in Calves.—Rennet is said to be a sure remedy for scours. "Soak a piece as large as a thimble in a cupful of water, and administer it; one dose will effectually check the disorder."

Diseases of Cows.—*Abortion.*—The frequency, with which cows have prematurely slipped their calves in some districts of this country within the last five years, has been such as to cause wide-spread alarm in the States affected. In many instances, it seems to have taken an epizootic form, whole droves, townships and counties being similarly afflicted as by a contagion. In 1866, the New York State Agricultural Society memorialized the Legislature to take action for the suppression of the disease, setting forth "that in New York the annual value of the butter made exceeds forty millions of dollars; and the annual value of the cheese manufactured exceeds six millions of dollars; that a subtle and hitherto undis-

covered disease has existed for years past, which causes abortion in the cows of the dairy districts; that this disease has been constantly increasing, and that its ravages during the past year have been unusually appalling. Over eight thousand cows have been lost in Herkimer county alone during the past year from this disease, which is spreading in the counties of Oneida, Lewis, and other dairy districts."

A commission was appointed. A report was made in 1868, by Professor DALTON, who had ascertained the following mentioned facts:

"1. Abortion in cows only exist to an alarming extent in the States of New York and Massachusetts.

"2. In New York State it is increasing, abortions being now about five per cent. of all pregnancies

"3. The disease does not depend on the amount of butter and cheese taken from the cow.

"4. Good milkers are shown to be no more liable to it than poor ones.

"5. It does not occur oftener with the first calf than afterward.

"6. The greatest number of cases occur during the seventh, eighth, and ninth months of pregnancy—during January, February, and March—the increase beginning to be marked about the time the cows are housed in November.

"7. The disease can not be ascribed to cold and exposure, nor to defective stables.

"8. It is not caused by allowing the heifers to go to the bull at an immature age.

"9. It is not caused by the use of bulls too young and therefore imperfect in vigor or development.

"10. It is not due to an inflamed or diseased state of the uterus, *post mortem* examinations revealing only stoppage of fetal circulation previous to the occurrence of abortion.

"11. No original defects in the fetus can be seen which will account for its expulsion.

"12. A cow having once aborted, is about four times more likely to do so subsequently, than one never affected.

"13. The disease is not due to a too early separation of the calf from the dam.

"14. It is remarkably local in its ravages.

"15. Farms on which no cases are known to have occurred, are often contiguous to, and sometimes lie directly between farms on which the disease has been most severe, and *vice versa*.

"16. The disease is often carried from farm

to farm, and so far as the present state of the investigation affords any light, it appears that farms on which the cows are habitually raised, are much more likely to be exempt than those on which the cows are habitually purchased." Here is no positive recommendation. YOUATT says: "The sympathetic influence is the main cause of the slinking of the calves. Another cause is the extravagantly high condition in which cows are sometimes kept." These two causes can hardly account for the astonishing prevalence of abortion in the large dairy districts.

The editor of the *North British Agriculturist* attributes the disease, in many instances to drinking stagnant water. C. V. SHARPLEIGH, in the *American Stock Journal* says: "No doubt this is excited and produced by the fungi found on our grasses, which appear to possess a power somewhat similar to, but milder than, the ergot of rye."

JOHNSON says: "The causes are frequently involved in obscurity; but it may be mentioned, that an extremely hot and foul cow-house, a severe blow, violent exertion, starvation, plethora, an overloaded stomach, internal inflammations, constipated bowels, bad food or water, improper exposure, and the like, will now and then produce abortion." These conditions then, are to be avoided, and it may be that a disease which seems to be semi-infectious will yield to humane care and healthful influences.

Milk Fever—"Dropping after Calving."—Although parturition is a natural process, it is accompanied with a great deal of febrile excitement and liability to local inflammation. A sudden change of function from the womb to the udder results in pain with which the system sympathizes, and puerperal fever appears. Great milkers are very liable to it. The fever sometimes appears in two or three hours after calving; if four or five days have passed, the animal is usually considered safe. YOUATT recommends moderate bleeding to relieve the plethora, a dose of a pound to a pound and a half of Epsom salts, and an injection to move the bowels, and the subsequent administration of sedatives if needed. Some good practitioners object to bleeding, unless the cow was in too high a condition at the time of calving.

The *Rural New Yorker* says: "To prevent this fever keep the cow from exposure to cold and dampness near calving time, and for some time afterwards; give warm messes of wheat bran—after calving, made thin—three times a

day, and some water to drink from which the chill has been taken, if drawn from a well or cold spring. Four years since we had a cow which came in the first of May; she seemed smart, and the third day was given a cold mess of bran and water at noon. The next morning she was in great distress, would rise up, tremble, and fall down, and had not eaten the hay placed in her manger over night. The stable floor was littered with straw a foot thick to prevent her from injuring herself when falling. A piece of saltpeter the size of a large pea was dissolved in a pint of water, put in a long-necked bottle and poured down her; then she was vigorously rubbed all over with wisps of straw, and covered with a thick woolen bed-quilt, to draw the internal warmth to the surface—her limbs often well rubbed. Some warm gruel (made of bran and flour, mixed) was poured down her, as she could eat nothing herself, her calf permitted to run with her, and having a good appetite took every opportunity to get what milk it could. The rubbing and external warmth were kept up; the second dose of dissolved saltpeter was given twenty-four hours after the first; repeated doses of wheat bran and flour gruel given, and some young, tender grass picked and placed in her mouth. The second day she did not tremble so much, and could stand longer; the third day was much better, and the fourth being pleasant she was let out to feed on tender grass near, and return to the stable when tired. She soon became as well as ever."

Mr. BENJAMIN WILCOX, a well-known and extensive dairyman, of Herkimer county, New York, speaks of several cures that have been made for this disease by a simpler remedy—merely the use of cold water thrown upon the body of the cow. The cases alluded to were bad, the animals' limbs paralyzed, the cows unable to rise, and were given up as lost by the owner. At that stage of the disease several pails of cold water were thrown upon the loins, along the back, and over the body of the cows, which soon gave relief, the use of the limbs restored, and the animals saved. It is his opinion that losses may be generally avoided by the use of water in the way described, more especially if the animal be placed on a low diet, and kept in a cool place for a few days before and after being attacked with the disease.

Milk Sickness, or Trembles.—This disease is peculiar to America, and little known west of the Mississippi Valley. Its prevalence is confined to no season. Mr. STEVENS, in his edi-

tion of YOUATT, says: "Its latent presence may be discovered by subjecting the suspected animal to a violent degree of exercise, when according to the intensity of the existing cause, it will be seized with tremors, spasms, convulsions, or even death." Its cause has been entirely unknown, and its cure has consisted solely in opening the bowels. Since 1860, according to the *Medical and Surgical Reporter*, it has been discovered by WILLIAM JERRY, of Edwardsville, Illinois, and Dr. MCPHEETERS, of St. Louis, that the disease results from eating the White Snake root.

Garget, or Caked Bag.—Inflammation of the udder is very apt to attack young cows, and is often induced and promoted by the new-milch cow lying down on the damp ground or a cold floor. Warm stables are a preventive of many ailments. A writer in the *Prairie Farmer* recommends another "ounce of prevention," in drawing the milk from the bag a few days before the calf is expected, and as soon as the udder becomes distended. This has saved him much trouble and expense.

"The most effectual remedy for this," says YOUATT, "in the early stages, is very simple: The calf should be put to the mother, and it should suck and knock about the udder at pleasure." If it becomes very serious, he adds, the cow should be bled; a dose of physic administered; the udder well fomented; the milk drawn gently off, at least twice a day, and an ointment applied to the bag. The ointment may be made of sage or bitter-sweet and hog's lard, simmered together—or simple linseed oil. Soft soap is sometimes an effective application. An old dairyman writes: "It can be effectually cured by administering half a tea-spoonful of tincture of aconite given in a little ground feed. I have known cows, when it was impossible to draw the milk, cured in twenty-four hours' time."

The *Western Farmer* confidently recommends thorough bathings of the bag in cold water, two or three times, and daubing the udder with hop yeast.

Warts on Teats.—One recommends the following remedy: "Neats foot-oil, beef's gall, spirits of turpentine, and old brandy, equal parts of each. Shake well before using. Apply once a day." Another: "Five cents worth of either lunar caustic, or caustic of potash, will cure warts on the teats of cows. Keep the caustic in a vial; take a stick, wet the end with water and rub the caustic on the warts. Two or three applications will suffice. Be very care-

ful or it will eat too deep and make a sore."

Warts on teats usually go no deeper than the skin, and they may be cut off close with sharp shears, without harm, when the cow does not give milk. A double teat may be removed by twisting a piece of fine wire around it and stopping the circulation. In ten or twelve days the teat will drop off, and new skin will form over the scar. For sore teats, apply an ointment of beeswax and linseed oil, or a preparation of an ounce of glycerine and fifteen grains of tannin. It will save the milk from spilling, and the cow from kicking and getting kicked.

Diseases and Ailments of Cattle.

Under this head we shall treat briefly some of the more common ailments of neat cattle in America, referring the reader who seeks for more elaborate directions, to those books which are devoted specifically to Farm Stock. In several instances, we have recited two or more remedies which are recommended on good authority for the same disease, leaving the choice to the reader's own judgment or convenience.

Let him remember, however, first and last of all, that there is no veterinary surgeon so effective when animals are sick, as Doctor NURSE. Give the afflicted creature the best care and shelter, and feed and water, with good judgment and caution, and the necessity for medicine will very often be avoided.

Bloat.—This is sometimes known as hoove, a gaseous distention of the stomach and bowels, occasioned by overeating or the evolution of gas from green food, especially clover in a state of fermentation, which results from an impaired state of the digestive functions. An animal thus affected requires immediate relief, or it dies. The *Boston Cultivator* suggests the following as the best remedy: Dissolve, in a quart of warm water, about two ounces of hyposulphite of soda, then add two ounces of fluid extract of ginger, and drench the animal with the same; give injections of soap-suds about every twenty minutes, or until the animal passes wind from the rectum, when immediate relief is the result. In cases of great distention, the probang and stomach-pump are most efficacious, and sometimes the main reliance. We may add here that for all sorts of indigestion in cattle, powdered charcoal is an admirable remedy—five to ten tea-spoonful being a dose.

Black Leg is an insidious disease that seizes cattle and kills them in a few hours. The fore legs and shoulders become congested, and the

animal attacked drops helpless. A correspondent of the *Western Farmer* says: "For two years, the black leg prevailed in this vicinity, severely attacking colts, calves, and yearlings. I have never known it to attack an animal over two years old. The great difficulty is in not knowing of the disease in time to effect a cure. The only remedy I know of is sulphur and spirits of turpentine, mostly sulphur, given plentifully."

Barn Itch.—This is often a troublesome disorder. It is contagious, and liable to run through the whole herd, if not arrested. The disease is cured by mingling sulphur with oil or lard, and applying the mixture to the diseased parts. A strong dose of physic may also be administered.

Mad Itch has been cured by giving cows as much soot and salt as they would eat, with a pound of sulphur a few hours afterward, and in the morning as much salts. Another says: "Give a mixture of powdered mandrake, one drachm; ginger, half an ounce; cream of tartar, half a drachm; flaxseed tea, one pint. Give an injection of two quarts of soap-suds, in which mix half a drachm of mandrake, and two drachms of ginger. For food, give them thin gruel, seasoned with salt, for a few days."

Choking.—For cattle choking with turnip or potato, get eight feet of telegraph wire, double it in the middle, and twist it together, so as to leave a loop in it. Take the creature by the horns and run the loop end of the wire carefully down its throat, and pull it out, and the turnip will be either pushed down or pulled up, giving instant relief. Some farmers use a stick with a flaxen swab on the end, soaked in melted lard or oil. If not too far down, the obstruction may be removed with the hand.

A Portland correspondent of the *New England Farmer* gives the following easy and simple remedy: "The instant a creature becomes choked, no matter what with, the throat becomes dry, and the longer the substance remains, the drier the throat. The following is a sure remedy: Take some oil, no matter what kind, and hold the creature's head up and turn down about one gill of oil, and then let go of the head, and the creature will heave it out in two seconds! I have tried it for years, and never knew it to fail." A drench of six beaten eggs and two ounces of salt is also said to be effective in giving relief.

Epileptic Fits.—Horses, cattle, sheep and pigs are subject to these fits. The best thing that can be done with the last-mentioned three

classes, is to fatten and butcher them after the appearance of the first fit; and, if you ride a horse occasionally so afflicted, get your life insured for the benefit of surviving relations. Valerian has been much recommended as a remedy for epilepsy. In the horse and ox it may be given in two ounce doses; in the sheep in half ounce doses, and in the pig in two drachm doses.

Flies.—Cattle cease to be annoyed by flies if washed with a weak solution of phenic or carbolic acid; or they may be rubbed with strong solution of walnut leaves.

Foot Rot, or foul-in-the-foot, is one of the most common and painful ailments of the ox. An old English work proposes the following remedy: "If the disease first appears between the claws, wash the part clean; when dry, rub a tar rope to and fro between the claws till an evident warmth is produced; then dress the part with a wooden skewer dipped in butter of antimony, oil of vitriol, or nitrous acid. Let them stand dry for an hour or two, and then turn them on a dry pasture. Repeat this for three or four days successively. If inflammation appears, reduce it by a poultice of linseed meal, or rye flour. The cure will be accelerated by administering the following saline purgative: Take of glauber salts, one pound; ginger, powdered, two ounces; molasses, four ounces; add two pints of boiling water, and when blood warm, give at one dose. Particular care is requisite to keep the animals on dry pasture for a week or two."

Hoof Ail is quite a different disease, and more formidable, and is chiefly visible at the crown of the hoof. Various remedies are proposed for it, but none seem to have given speedy or effectual relief. Sawing off the ends of the hoof, at the outset, has been found much the best remedy.

"Horn Ail."—There is probably no such disease as horn ail, or hollow horn, or "horn distemper;" it is really only a symptom of fever and other derangements of the body. When the horns are unusually cold or warm it indicates only that the animal is suffering from some functional difficulty elsewhere. A writer in the *Rural American* says, when these symptoms appear, "take a quantity of black-ash bark; steep it strong and give a pint of the warm decoction to a dose, at the same time bathing the loins thoroughly with the same. I will warrant a cure in two days. It needs to be given but once." DADD says: "Endeavor to promote a healthy action through the whole

system; to stimulate the digestive organs; to remove obstructions, both by injections, if necessary, and by the use of aperients; lastly, invite action to the extremities, by stimulating liniments, and 'horn ail' soon disappears." Boring holes in the horn, pouring boiling water on the head, and cutting off "an inch of the tail," are cruel delusions of the ignorant.

Lice.—CALEB CANFIELD, of Livingston county, Michigan, writes to the *Rural* that he is not troubled with lice on cattle, horses, hogs, hens, or geese, or ticks on sheep. His remedy is sulphur. To an ox, or cow, or hen, he gives a table-spoonful in the feed; to sheep less. He puts it in the coops of the fowls in small lumps; feeds it once a month in Winter, but not in Summer, except to hogs. He gives his horned cattle and horses a spoonful of pulverized saltpeter in the month of March or April, and again, without fail, when he turns them out to grass. ISAAC SCHAUBER, of Saratoga county, New York, says: "A few applications of good cider vinegar along the backbone, on the head, and other places where the lice gather, will soon finish them." Another certain remedy is, first grease the afflicted animal, and then sift anthracite coal ashes all through the hair.

Onions fed to calves and other neat stock will rid them of lice, and improve their appearance and condition. So tobacco will kill lice, as it will kill any animal but man—and it kills him after a while. Water for this purpose should be prepared by boiling cheap damaged tobacco. EFFIE GREY, of Cumberland county, Pennsylvania, says she killed all the lice on a terribly-infested herd by pouring petroleum over their backs. "I then turned them out in the sun, and such pranks as they cut! I thought they were going crazy—but it did its work. About four o'clock I examined them, and every louse, little and big, was on the outer end of the hairs, dead enough."

Insects have no lungs, but breathe by spiracles or minute holes in their bodies; and if these spiracles are clogged with grease or fat, they become suffocated and die. The application of oil in cold weather is bad, however. All mercurial poisons are dangerous, for the cattle will lick themselves. Good wholesome food and care will generally keep lice out of a barn-yard.

Murrain.—This is an ancient disease which has afflicted cattle ever since the earliest history of the Egyptians. It is really an epidemic catarrh in a malignant form. In some

parts of Europe whole districts have been swept of their live stock. In its dangerous form, the cough becomes frequent and convulsive; bloody matter runs from nostrils and mouth; the eyes become unusually dull; the pulse is small and feeble; the respiration is quicker; the flanks are tucked up; the tenderness on the loins is removed; insensibility is stealing over the frame; and the fæces are more loaded with mucus, and more fetid. The patient moans and lows, and grinds his teeth almost incessantly; the head is agitated by a convulsive motion; blood begins to mingle with the fæces; the breath, and even the perspiration, becomes offensive; and the beast staggers as he walks.

"The early stage of murrain," says YOUATT, "is one of fever, and the treatment should correspond with this—bleeding. Physic should be cautiously, yet not timorously, resorted to. For sedative medicines there will be rarely room, unless the cough should continue. Small doses of purgative medicine, with more of the aromatic than we generally add, will be serviceable, effecting the present purpose, and not hastening or increasing the debility which generally is at hand; but if the bowels be sufficiently open, or diarrhea should threaten, and yet symptoms of fever should be apparent, no purgative must be given, but the sedatives should be mingled with some vegetable tonic. The peculiar fetid diarrhea must be met with astringents, mingled also with vegetable tonics. In combating the pustular and sloughing gangrenous stage, the chloride of lime will be the best external application; while a little of it administered with the other medicines inwardly may possibly lessen the tendency to general decomposition."

Pleuro Pneumonia.—The pleuro pneumonia is one of the most fatal and distressing maladies that ever attack cattle. At all times liable to spread rapidly among animals coming near or in contact with those diseased, it frequently assumes the form of a contagious epidemic, being taken by almost every animal coming within striking distance. It is a malignant form of inflammation of the lungs, of an eminently contagious character, peculiar to the ox-tribe, and has existed within the memory of man in the mountain regions of Central Europe.

Within a few years it has made serious ravages in some sections of this country. The first signs of the disease are visible in two to eight weeks after exposure; the animal has a

slight cough and shiver, and there is a diminution of the appetite and milk secretion. Costiveness soon follows; shivering fits recur; the temperature and pulse rise, and all the symptoms of an acute fever set in. The creature moans; the action of the abdominal muscles is spasmodic. Pressure on the ribs causes pain and shrinking. The eyes are bloodshot, mouth clammy, skin dry and tightly bound to the subcutaneous tissues, and the urine is scanty and high-colored.

There are symptoms like the bronchitis; and the lungs rapidly give way. The beast has a discharge from the eyes, and a fetid, sanious discharge from the nose. Not unfrequently it coughs up disorganized lung-tissue and putrid pus. Great prostration, and indeed, typhus symptoms set in. There is a fetid diarrhea, and the animal sinks in the most emaciated state, often dying from suffocation, in consequence of the complete destruction of the organs concerned in respiration.

In treatment, cut off all communication with the ascertained source of the disease. Do not disturb the cows or the oxen from their stalls, as removing them tends to spread disease, and does no good to the cattle. Allow water, feed judiciously, and give carbonate of ammonia, preparations of iron, gentian, or other tonics, sparingly.

About three-fourths of the animals exposed take the disease. One-fourth die, and about one-fourth are rendered comparatively worthless. Few, if any, ever entirely recover.

Red Water.—The disease known as red water from the color of the urine, is one of the most intractable maladies of cattle and sheep, and is frequent in this country. It may be technically divided into *acute* and *chronic*, or familiarly into red water proper, and yellow water.

Red water, also known as the bloody murrain, is from inflammation of the kidneys; it is at once characterized by pain and high fever, dysentery followed by costiveness and a flow of bloody urine. It requires active treatment and runs its course in a few days.

Yellow water is more prevalent; it is from inflammation of the kidneys; the urine is characterized by the dark-brown color of vitiated bile; its action is slower but equally fatal. In this disease, the liver always becomes enlarged and inflamed, sometimes rotten, and clotted with blood.

The remedy recommended by YOUATT for both forms of the disease, is: 1, Bleeding ac-

cording to the condition of the animal; 2, purging with half-hour doses of Epsom salts. "The commencement of purging should be the signal of recovery." Astringents and stimulants, he thinks, should be avoided.

This disease seems to be peculiar to certain pastures; it oftenest occurs in woody districts, and especially in low, swampy land; and it is most prevalent in Spring and Autumn. Sometimes it seems to be infectious. Little is known of its real cause.

The *Western Rural* says: "Cattle and sheep fed exclusively on turnips, or on rank, innutritious pastures for a considerable time are liable to red water. Food which contains a very high percentage of water, and but a small percentage of the nutritive substances necessary to repair the waste of the body, does not supply a sufficient amount of nutrient materials to the blood."

A writer in the *Rural American* says the affliction is referable to leeches taken into the stomach: "If you have an animal die of this disease, open it, and take out the liver, wash it, and take a knife, and begin at the end and slice it thin, and you will find holes that appear as if a small bullet had passed through; and if you examine the liver carefully you will find a leech there. I had an ox that lived two weeks after the attack, and on opening him I found a leech in his liver. In another case, a two year old steer kicked up his heels and played at evening, and the next morning he was dead. I opened him and found three leeches in his liver. No one who waters his stock the year round, in pure deep water, loses any by this disease."

The *Southern Planter* publishes the following, from FRANK G. RUFFIN: "As a sure preventive, take a mixture of the following proportions: Salt, one gallon; flour sulphur, one-half pint; saltpeter, one-half pint; copperas, one gill. Pulverize thoroughly and mix, and keep it where the cow can get to it daily. As a cure: Either sugar or molasses—the sugar as a bolus, the molasses as a drench—a pint of sugar or a gallon of molasses, and the dose repeated at intervals until the animal is relieved or dies. After the beast is relieved a tea-spoonful of calomel may be used."

Mr. SHELTON, of Michigan, cured an ox violently attacked, by mixing half an ounce of copperas and half an ounce of alum, dissolving them in hot water and while warm turning it down the animal. In twelve hours he was better, and a repetition of the dose

cured him, though for a time weak from the great discharge of blood.

Scours (Diarrhea).—A large stock grower recommends corn meal as an infallible cure for scours in animals—a pint in a warm-bran mash, given once a day. YOUATT says “the most effectual medicines are prepared chalk, opium, catechu, and ginger, mixed in the proportions of one ounce of the first, one drachm of the second, four drachms of the third, and two of the last to each dose—to be administered in thick gruel,” after the action of a mild purgative.

Sores.—“Wounds and sores of cattle are quickly cured by washing them several times a day with a mixture of spirits of turpentine and the yolk of eggs.” S. BIRD, in the *Maine Farmer*, says: “For sores, flesh wounds, bruises, sprains, etc., on horses, shower with cold water two or three times a day, and when dry wash with Roman wormwood tea, salt and water, or beef brine. Never wrap up sores or sprains.” YOUATT recommends the following ointment for sores and abrasions: “An ounce of beeswax and three of lard, with a quarter of an ounce of sugar of lead, and a drachm of powdered alum.”

Smut Corn Disease.—A disease, attributed to eating smut corn, often proves very fatal in a herd of cattle. The eyes soon appear blind and staring, the limbs stretched and rigid, the breath hot, and the muscles of the flank and shoulder, together with those of the face and lips, twitching convulsively, with a low moaning of distress. The remedy of Professor GANGEY, President of the London Veterinary College, is: One pound of Epsom salts, an ounce of aloes, or four ounces of sulphur, the whole mixed, and poured down the animal's throat. A few hours will show a favorable change, and full restoration will soon follow. This remedy has been tried in the Northwest, and its efficiency has been vouched for by reliable men.

Texas Cattle Disease.—In 1868, the cattle-growing States of the West were visited by a new and alarming disease in their herds, introduced by Texan cattle, and transportation spread the plague and the consequent panic through many of the Northern States. The most stringent measures were introduced to confine and abolish the disease, with complete apparent success, but it was feared that it would reappear with subsequent warm seasons.

The Special Commissioners for Massachusetts reported to the Legislature, January 1,

1869, the result of their investigations. We extract from their report: “As a general rule, the first symptoms of the disease was a loss of appetite, and desire for isolation or separation from the rest of the herd. The animal soon showed indications of pain and fever, stood with all four feet drawn together under the body, inclined to lie down and get up often, occasionally stretching and turning the muzzle to the side, eyes looking wild, horns cold. The urinous discharges usually were of a bloody color, though this discharge in many cases appeared natural and healthy. The feces were of a slimy or mucous character, and passed with difficulty, and the mouth and tongue inclined to be hot and dry. On being slaughtered, we noticed that the blood of the animals was very thin and watery, and would not color the hand when dipped into it, and apparently without coagulating properties. The surface of all internal viscera, the brain, and the white of the eye, was of a pale yellow color. The organs of the chest appeared healthy, but it was otherwise with those of the abdomen. The milts, or spleen, in every case, were three or four times as large as in a healthy animal, and its texture soft and granulated, the kidneys dry and lifeless, the bladder inflamed and distended with a collection of bloody-colored water, and in most cases the liver very much enlarged, and the gall bladder contracted and filled with a gelatinous substance.

In December, 1868, a national convention to consider the disease assembled at Springfield, Illinois. Twelve States were represented. The convention urged the enactment of stringent laws to prevent the spread of the disease, and the appointment, in each State, of three commissioners to execute them, and to watch over the general welfare of the animals within the State. Three theories were advanced: 1, That the Texas steer carries within him a virus which he deposits on the soil where he grazes; 2, that his blood contains cryptogamic plants, or spores; 3, that he sheds multitudes of dangerous ticks which are consumed in large numbers by animals feeding subsequently in the field.

From the evidence already obtained, says E. F. THAYER, Commissioner for Massachusetts, the following deductions are made:

That Texas cattle when driven or transported North in the Spring or Summer months, communicate a fatal disease to native cattle, although the Texas cattle appear perfectly healthy.

That Texas cattle are not subject to the same disease in Texas.

That it is necessary, with exceptional cases, that native cattle feed on the same land where Texas cattle have grazed, to become infected.

That aged animals are more susceptible to the disease than young ones. Suckling calves rarely die from it.

That native cattle do not communicate the disease to others.

That Texas cattle, after having been Wintered North, will not communicate the disease.

That severe frosts remove the danger of communicating the disease, and that Texas cattle may be safely brought North from November to March.

That it is of great importance, both to the Eastern and Western people, that the traffic in Texas cattle be unrestricted as far as it can be done with safety. Through it the Western farmer is enabled to turn his rich fields of grass and corn into money, and the Eastern people are furnished with a supply of beef at a price within the means of every one.

As but little is known about the disease, but little can be said of treating it. In the Western States the turning of a herd of sick cattle into a field of green corn has proved beneficial; consequently, when practicable, cathartics should be administered.

In Chicago seventeen animals were treated with quinine and aromatic sulphuric acid, nine of which recovered. In New York carbolic acid has been administered, and highly extolled. In Cincinnati several animals were treated with the same remedy, without apparent benefit. Of course an infected animal should immediately be separated from all other cattle.

Care and Feeding of Cattle.—A farmer has as much right to abuse his wife or starve his children as to neglect his neat cattle, and leave them in the Winter to "shift for themselves." It is not only cruel and unmanly, but it is—what some men appreciate better—unprofitable. It is no fancy of sentimental philanthropists, but a well-attested fact, that stall-fed cattle will keep in good condition on one-third less food than is required by cattle that are unhoused in cold weather. Sheep properly protected from the cold and storms produce better and finer fleeces; cows yield more milk, and all kinds of animals retain and take on flesh more readily and rapidly, on much less food than when exposed to the ex-

trêmes of the temperature to which this country is so subject.

There are certain conditions, says the *Stock Journal*, always required in growing, feeding, or using stock for labor or pleasure, and unless you can make up your mind to comply with these conditions, you had better not engage in the business. It must have enough to eat of the right kind of food, just enough and none to waste; must have this at regular intervals, not less than three times a day; must have water as often; must be kept clean; must be kept comfortable—not too much exposed to heat in Summer, nor cold and storms in Winter; must have access to salt, or be salted not less than once a week; must not be driven about by other more powerful or ill-natured animals; and must be looked after every day to see that it is in good health.

Care of Cows.—Every animal, but especially milch cows, should be kept in a comfortable condition, both as to temperature and food, from the day of their birth. This is strict economy. They should have a warm barn and a clean one; they should be fed at regular hours with roots in Winter; they should be milked and managed with all gentleness; they should never be left out in the cold; they should be curried every morning; they should have water passing before them in a trough, if the amount of stock will justify the expense; they should be milked dry every time, and milked quickly and tenderly. How are they treated? Occasionally they are left out to be weather-beaten, and are seen crawling about by day, to pick cornstalks out of the morning's snow-drift, and lying by night under the warm side of a haystack. Some men who would not be guilty of such treatment, keep cows that are hurried to an unshaded pasture in Summer, and in Winter are thrust into hideously offensive stables, whence they are driven to water by chance, and where they never see a pint of meal or smell a root, but are milked and stripped till the persistent milker is kicked from his stool by a new-born calf.

Currying.—Milk does not all come, as the Scotch say, "through the mouth." It comes largely from Care. Warm stables and a daily currying bear the same relation to cows after they have been fed, that hoeing bears to corn after it has been manured. Cows that are curried will give more milk and thrive better than others on the same food. Yet how many milch cows do we see that exhibit from month to month their unchanged heraldry of nasti-

ness, wearing upon the breach an impenetrable coat of mail, suggestive of anything but sweet milk! If GUENON had lived in some American counties, he would never have discovered his "milk mirror."

Yards and Stables.—A jolly philosopher writes: "In going to fodder the cattle in the yard these cold mornings, the first thing done should be to rouse them up, slap their hams, catch them by the horns, pull their ears, hustle them around the yard, clap your hands, make a joyful noise, and have a good frolic with them. It will warm them up and give them an appetite for their fodder. They will soon learn to like it and greet your appearance with a knowing wink and an affectionate brute smile, as much as to say, 'Now for the fun.'"

But our playful counsellor forgets that cattle should not be foddered "*in the yard* these cold mornings." They should invariably be kept on Winter nights in warm stables, or much better, in comfortable stalls, where they should always be fed in the morning. If turned out at all, let it be at midday, when the sunshine falls warm into the yard, which should, of course, have a full southern exposure. Let them pick for two or three hours at a rick of salted straw or cornstalks, and turn them back for their evening feed. This is the method generally adopted in Pennsylvania, and largely in New York, and in no States is live stock better cared for than in these.

It sometimes seems necessary to the pioneer to leave his cattle exposed on the prairie, but it is surely a foolish and wasteful cruelty; for a slab shed is inexpensive, and can always be afforded, and, if topped and surrounded by hay, it will be tolerably comfortable.

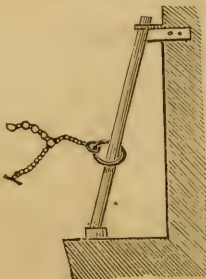
Cattle Stalls.—We have described and illustrated, under the proper head, a model barn, with the stable arrangements for cattle. The floor of a stall should always have an outward pitch of at least half an inch to the foot, and should consist of a raised platform, just long enough for a cow to stand upon, and terminating, in the rear, in a manure gutter six inches deep, running the whole length between the dais and the walk, to catch the droppings and the urine. In this way, the stalls will be kept entirely clean, with little trouble.

The *Saturday Evening Post* says: "We have seen lately in one neighborhood up in the mountain farm regions of Pennsylvania, three instances of what appear to us to be comfortable, common-sense stalls for cattle. The stalls are wide enough to admit of the animals turning in

them, the sides closely boarded up. There are no rings, stanchions, or any tying or fastening by the head. No animal not absolutely a fool, will ever stand, head down hill, and always, in every instance, we found the cattle in these stalls, standing "right end up," well up to the rack, and as clean and comfortable as animals ever need be. As all the bovine animals have their little itches and inconveniences to attend to as well as ourselves, and would be better for the use of their tongue with which they can reach nearly every part of their bodies, this freedom of the stall seems to be a very good common-sense arrangement, besides providing comfortable quarters in all cold, stormy weather."

Stanchions.—Stanchions, as fixtures for cows, seem to be returning to favor in some States. Each one consists of two upright stakes or strips of plank, placed just far enough apart for the neck to move up and down freely, but not allowing the escape of the head. One of the strips is movable at the top so as to slide open far enough to admit the head of the animal, when it is returned to its place, and secured by a pin. In one large establishment where a hundred cows are kept, the movable stakes are attached to a long rod, by which all the cows are released, and returning to their messes, are fastened by a single movement of the hand. Stanchions are economical of space, they prevent litter of food, and they do not permit the animal to lie down on its droppings; but they always suggest imprisonment, and we think stock will thrive better at a chain tie.

A Cattle Tie.—One of the best, if not the very best, plans for stalling cattle, is that represented by the accompanying cut of a movable chain tie.



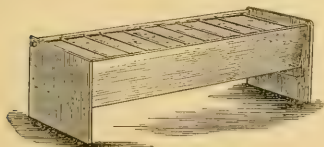
MOVABLE CATTLE TIE.

The large ring plays up and down on a stationary round post set up in a low manger, and

the chain is fastened to the horns. It may be thought that this chain wears off the hair on the head of the animal, but this is not the fact. It is the neatest and most secure fastening in use, and at the same time the most comfortable; the animal slips the chain up and down the stationary post, by the large ring, as it wishes to move its head in feeding or getting up and lying down; it can also turn and lick itself when thus fastened. The great superiority of a chain is its durability, while its expense is slight. When animals are fastened in this way, there need be no partitions between them, and no cumbersome machinery about their heads. They can stand within four feet of each other.

The farmer's stock around him partakes more or less of the quality of the owner or those who attend upon it. A man's influence is imparted to his beasts, particularly the horses, the working cattle, and the milch cows. A man of irascible temper, gets up nervousness in a horse or cow. The brute becomes afraid of him; and, if of a vicious nature, is apt to be hurtfully, spitefully influenced, perhaps irreclaimably spoiled—whereas, a mild-tempered, discriminative man will gradually smooth down the asperities of a harsh disposition.

Rack for Feeding Cattle.—The accompanying cut from *Rural Affairs*, represents a manger for the barn-yard, which has obvious advantages. The rack is made like a ladder, and slides up and down in slots on the back side of both ends, and drops as the hay is eaten. It turns up like the lid of a chest when the hay is put



CATTLE RACK.

in. The manger may be from six to ten feet long, two and a half feet wide, and two feet high. The spaces in the rack may be eight inches. Thus secured, little food will be lost, whether it be hay, straw, or stalks, cut feed, or roots.

Summer Shelter for Stock.—The *Dixie Farmer* makes the following suggestions for the comfort of stock in pasture in midsummer: "Trees, which are more or less common in all pastures, afford a good shade, but a cheap temporary shed is even better, and should always be built if there is no other protection. An open shed,

through which the air will freely pass, and near a brook if possible, should be erected and provided with boxes for holding salt, that the cattle may partake of it at pleasure. In the middle of these hot Summer days they will not eat, and how much better and more humane for the farmer to build such a shed in which they can lie and rest themselves. Sheep and milch cows especially need such a protection."

Sand for Bedding.—Dry forest leaves make a better and cheaper bedding than straw, and they are worth more to work into manure, and nothing for any other purpose. At the State Almshouse, Massachusetts, the manager of the farm beds his cows regularly with sand, which he considers superior to any other substance for that purpose. It is warm, easy to lie upon, prevents the cow from slipping, when reaching her food, is an excellent absorbent of liquids, easily shoveled in and out, a superior divisor of droppings, and is an excellent substance to apply to cold lands. For these reasons he likes sand for bedding. Many good farmers agree with him.

Water for Stock.—There are thousands of lazy, shiftless, thriftless farmers in every State, who regard water for stock as quite an insignificant matter, and who compel their cows to wander about each day in pursuit of it, and drop their manure where it will be a nuisance rather than a benefit. It is the opinion of experienced stock growers, that cattle suffer more in Winter from want of water than from want of feed. When we consider the quantity of water contained in the green feed of Summer, and the quantity which cattle drink besides, and that the Winter feed, with the exception of roots, is almost destitute of water, the necessity for ample provisions for water in the Winter is obvious. It is doubtless true that stock require more water in Summer than Winter, as they throw off more by perspiration; but it is a well-ascertained fact that when chilled by the cold, animals are inclined to take less water than the proper digestion of their food requires. Added to this, the frequent difficulty and danger of access to the water, even when it is near at hand, and the necessity they are under of sipping it slowly at the freezing points, leads them to content themselves with less than they really desire, if they could obtain it with ease and safety and at a temperature that would not make their teeth ache, and the cold chills to run along their backs. The consequence is, that they get but a moiety of the nutriment contained in their feed, their bowels become

constipated, their hides bound, and they are peculiarly exposed to the attacks of lice, murrain, or the mad itch.

The cattle may be, without great expense, supplied with water from a spring, when there is one near and above the barn-yard level; or from a well, pumped by a cheap windmill; or from a cistern supplied from the barn eaves. Most large dairy farmers will find it profitable to send the water through the stalls in a pipe, so feeding a little tank in each manger that the cows can help themselves whenever they thirst. The tank should have a cover that will shut of its own weight. Any cow will soon learn to open it with her nose.

The arrangements for obtaining water will be found treated more definitely elsewhere.

Does it Pay to Keep Cattle Warm?—Many farmers who keep their stock warm, add the expense of stabling to account of profit and loss, and reflect complacently on their philanthropy. But *they have actually put money in their purse.* Here is farmer X, who lets his cattle "lie out" half the Winter. He began the Winter with a barn full of hay, a crib full of corn, and a field full of stacks. Now it is Spring, and every kernel and wisp is consumed, yet the stock are poorer than in November. Where has the food gone? It has been used up wholly in keeping these animals warm. Nature requires that the blood of an animal shall be the same temperature at all times; this heat is mostly derived from the sun in warm weather, and the food that the animal consumes is turned into growth and fat. If the farmer will keep his animals as warm in January as in July, on the same food, they will increase in flesh as rapidly in Winter as in Summer.

In hot climates, under the tropics, for instance, the human diet is almost exclusively a vegetable one. Under a latitude of forty or fifty degrees, we require considerable animal food—if we advance to the frozen regions of the north, whale oil, bear's fat, and walrus grease are found among the luxuries of the board. These gross materials, almost to the exclusion of vegetables, are there found indispensable to keep up the necessary supply of nutrition and warmth. It is just as true of animals that a cold atmosphere requires an extra quantity of food to sustain life and maintain health. If kept warm and snug with plank and straw they will need much less food.

Moreover, any experienced dairyman will tell you that a stall-fed cow will give one-fourth

to one-third more milk than a barn-yard fed one, on the same food. Suppose it costs forty dollars each to Winter four cows exposed to the cold, and suppose that only ten per cent. of this is required for animal heat when it is freezing weather; there is a leak of sixteen dollars annually or one hundred and sixty dollars in ten years, besides a loss of as much more in milk, all of which might have been saved by one day's work, and five dollars worth of lumber! The entire Summer is sometimes necessary to restore the vigor and condition lost by the shortsighted economy of the Winter.

Exercise or Quiet?—It is generally held that some sort of daily exercise out of the stable is essential to the health and vigor, not only of bulls and stallions, but of cows and all farm stock. Yet some of the best stock growers practice on a different theory, keeping their stock in stall, month after month, through the entire Winter, without once letting them out. S. M. WELLS, of Wethersfield, Connecticut, a large dairy farmer, keeps his cows tied from Autumn to Spring, and insists that they appear the better for it, that their manure is all saved in the most economical form, that they give more milk and consume less food, and come forth sleeker and more active to the first taste of grass. Water is constantly at their noses. Mr. WELLS writes: "Cows in a dairy must be kept as quiet as possible. A uniform quantity of milk is demanded every day. When we had a cellar under our stalls, we found that the noise and disturbance caused by our occasional removal of the manure below, diminished the milk some fifteen per cent. Cows must not be annoyed."

A prominent feeder of Chester county, Pennsylvania, who fats beeves for market, writes to the *Country Gentleman*: "Experience has shown that cattle housed all the time will accumulate more fat, and be better contented, than if allowed to go out and become chilled every day for water; in fact, I consider it a loss of several days' feed for a steer to get loose. The temperature of the stable should be kept uniform as possible, and if a little care is taken, it need never fall below the freezing point in the coldest weather, as the animal heat generated by so many cattle, creates a warmth all through the building. Some of your readers may ask, do your cattle keep healthy without exercise? I reply that I have never had a sick steer for the past five years that I have been feeding in this manner, and their good appetites and glossy coats attest to their general

welfare. An experienced cattle feeder, and one to whom I am mostly indebted for this system of feeding, informs me that he has not lost a steer in eighteen years that he has been stall-feeding cattle this way."

An English stock grower says of fattening animals: "The animal should not be needlessly intruded upon during the hours of eating. All animals fatten much faster in the dark than in the light, a fact only to be accounted for by their greater quiet. Some of those creatures that are the most irritable and impatient of restraint while feeding, such as turkeys and geese, are found to take on fat rapidly when confined in dark rooms, and only fed at stated hours by hand. There is no surer proof that a pig is doing well, than to see him eat his meal quickly and then retire to his bed till the hour of feeding returns. Animals, while fattening, should never be alarmed, never rapidly driven, never be fed at unreasonable hours, and, above all things, never be allowed to want for food."

WHAT FEED IS BEST FOR STOCK?—We present a carefully prepared table of comparative equivalents:

FOODS.	Percentage of fresh form- ers in 100 pounds.....	Percentage of fat form- ers in 100 pounds.....	Total nutritive percent- age in 100 pounds.....	Nutritive equivalents of 100 pounds of superior English hay.....
Irish potatoes.....	1.4	18.9	20.3	165.3
Carrot.....	0.6	6.6	7.2	19.6
Parsnip.....	1.2	7.0	8.2	40.3
Jerusalem artichoke.....	1.0	18.8	19.8	251.3
Sugar beet.....	1.0	5.2	6.2	56.2
Common white turnip.....	0.9	3.3	4.2	98.7
Mangel wurzel.....	1.0	12.6	13.6	237.6
Green pea stalks.....	0.9	7.9	8.8	56.9
Spurry, (green).....	2.7	2.3	5.0	360.0
Green stalks of buckwheat.....	0.2	4.7	4.9	106.3
Common vetch, (green).....	1.9	2.6	4.5	106.8
French vetch, (green).....	0.7	4.7	5.4	92.2
Green stalks of white lupine.....	1.8	2.3	4.1	112.1
Green stalks of white bean.....	1.0	2.7	3.7	134.9
Green oats, (fodder).....	1.0	8.5	9.5	324.2
Green timothy grass.....	4.0	9.7	13.7	363.4
Green red-top grass.....	3.3	8.7	12.0	415.0
Superior English hay.....	3.6	26.3	29.9	100.0
White clover, (green).....	2.0	3.6	5.6	90.1
Lucerne, (green).....	1.5	2.7	4.2	98.7
Red clover, (hay).....	1.9	3.6	5.5	105.4
White clover, (hay).....	2.9	18.7	21.6	110.8
Lucerne, (hay).....	18.7	40.0	58.7	94.6
Indian corn.....	12.7	38.9	51.6	98.2
Rye meal.....	14.7	66.4	81.1	61.4
Barley meal.....	11.0	66.7	77.7	61.2
Oat meal.....	14.3	55.8	70.1	71.0
Buckwheat meal.....	13.0	52.0	65.0	76.0
Peas.....	18.0	51.1	69.1	72.0
Winged beans.....	9.0	52.1	61.1	83.5
White field beans.....	13.1	41.9	55.0	76.9
Lentils.....	23.9	29.3	53.2	75.7
English linseed cake.....	24.0	29.7	53.7	78.2
American linseed cake.....	25.7	28.9	54.6	77.0
	22.1	51.0	73.1	68.0
	22.2	48.6	70.8	70.3

The foregoing table is well worthy of thoughtful study by all stock growers. The figures are the result of averaging a large number of analyses made in England, Germany, France, and America; and they show, at a glance, the chemical value of each kind of food, and the kinds that may be used together the most advantageously. The "English hay" which is made the unit of the comparison, is about equal to our best timothy and red-top. A careful examination should save thousands of dollars, often injudiciously expended. It should be borne in mind, however, that some of these articles as, for example, the succulent roots, have an important auxiliary effect which is not indicated in this table. They act upon other food; they assist digestion; they serve as appetizers, and keep up the spirit and "tone" of the animal; so that their actual value, as proved in practice, is generally much greater than their apparent value, as indicated by chemistry.

Swedish turnips, represented in this table as being only one-fifth as nutritious as good hay, pound for pound, are shown by practice to be from one-third to one-half as nutritious. The use of carrots for feeding purposes, justifies a similar modification of the table in their favor.

Proportion of Water.—The following table, by Dr. LYON PLAYFAIR, is interesting, as exhibiting the relative amount of water in various plants. The result of his analysis will be found to be similar to that of the analysis of SPRENGEL:

One hundred pounds of	Contain.	
	Pounds of water.	Pounds of organic matter.
Peas.....	16	80½
Beans.....	14	82½
Oats.....	18	72
Barley meal.....	15½	82½
Hay.....	16	76½
White turnips.....	89	10
Ruta baga.....	89	14
Mangel wurzel.....	89	10
White carrot.....	87	12
Potatoes.....	72	27
Red beets.....	89	10

Daily Consumption of Hay.—A large number of experiments indicate, that the average amount of hay consumed daily by neat cattle, is about three pounds for each hundred pounds of the animal. From this basis an approximate estimate may be made of the amount required of the various kinds of food.

Proportion of Heat-Producing Elements.—We find in the *Cultivator*, from a correspondent, the following table, arranged to show, "as near as the present state of our knowledge enables us to exhibit the facts, the relative proportion

between the heat-producing and nutritive qualities of certain leading articles of food:"

	Nutritive.	Heat-producing.
Milk.....	1	2
Beans.....	1	2½
Oatmeal.....	1	5
Barley.....	1	7
Corn.....	1	4
Wheat.....	1	8
Potatoes.....	1	9
Rice.....	1	10
Turnips.....	1	11

Our system of feeding farm animals is certainly very defective, in that the feeding is not varied according to the service the animals are required to perform. An animal at rest requires relatively more heat-producing than nutritive food; while one subjected to labor in harness or yoke, requires more of the flesh and muscle-forming, and less of the heat-producing.

Another Comparison.—A correspondent indulges in the following speculation: "In estimating the comparative value of several of these products for feeding, I may be best understood by calculating that land that will grow fifty bushels of corn per acre, will also produce two and a half tons of clover hay—one and a half at the first cutting and one at the second; two tons of meadow hay, and five hundred to six hundred bushels of roots. These crops will vary on different soils, so that while not strictly correct, they are near enough for our present purpose. These calculations are made from a table of nutritive equivalents, in which the result of 'several different experiments' makes one hundred pounds of meadow hay equal to ninety-five pounds of clover hay, two hundred and sixty-two of ruta bagas, three hundred and forty-six of field beets, two hundred and eighty of carrots, and fifty-six pounds of corn. The cornstalks will be of some value and the second cutting of clover hay not quite so good as the first, so I will allow two pounds of clover hay to one of corn. Then, fifty bushels at sixty pounds per bushel per acre of corn, will make an acre of corn equal to three tons of clover hay, or one and one-fifth acres of clover. On the same estimate of two pounds of hay to one of corn, and two tons per acre, it will take one and a half acres of meadow hay to equal one acre of corn. Calculating turnips and carrots at five hundred bushels per acre, and beets at six hundred, one acre of roots will be nearly equal to two acres of corn—the root tops being put as an offset to the cornstalks."

Preparation of Food.—JOHNSON says: "Food should be so prepared that its nutritive prop-

erties may all be made available to the use of the animal; and not only so, but appropriated with the least possible expenditure of muscular energy. The ox that is obliged to wander over an acre to get the food he should find in two or three square rods—the horse that is two or three hours eating the coarse food he would swallow in fifteen minutes if the grain were ground, or the hay cut as it should be—the sheep that spends hours in making its way into a turnip, when if it were sliced it would eat it in as many minutes—the pig that eats raw potatoes, or whole corn, when either cooked could be eaten in one-quarter of the time, may indeed fatten, but much less rapidly than if the food were properly prepared. All food should be given in such a state, to fattening animals, that as little time as possible, on the part of the animal, shall be required in eating."

Steaming Food.—The above paragraph brings us naturally to the subject of steaming for stock—a method of preparing food whose profitability is still being earnestly discussed. There have, doubtless, been some extravagant estimates of its value; and many of the most experienced hold, that steaming will not pay in cases where the hay is all of good quality, or the stock less than twelve or fifteen head.

The Advantage.—Some have affirmed that the value of food is tripled by cooking, and GEORGE GEDDES, of Syracuse, one of the most careful farmers in New York State affirms, that cooking, independently of cutting, at least doubles its value. An English farmer, who keeps ninety head of cattle and horses, estimates that he saved thirty tons of hay in one year by chopping and steaming a mixture of equal parts of hay and straw, thus saving two hundred and seventy dollars worth of hay. The cost of the cutting and steaming was not forty dollars. E. W. STEWART, of New York, writes to the *American Farmer* that after an experience of more than ten years, he finds two bushels of steamed hay is worth three bushels of unsteamed, and that one quart of corn meal steamed with a bushel of straw is equal to a bushel of hay.

Mr. WELLS, of Connecticut, already quoted, has steamed his cattle-food for some years, with much benefit. In the State Board of Agriculture for 1869, he describes his process of feeding, as follows: "We feed cotton-seed meal with steamed hay and beets. Our method is, to prepare a sufficient quantity for two days supply. This requires for forty head, about 500 pounds of hay, 300 pounds of cornstalks,

and 200 pounds of meal. After it is thoroughly wet and mixed, it is put into a tank and steamed until corn put in with it can be crushed in the hand. We keep the cows in the stable about seven months of the year, turning them out in June. They are put in about the first of November. We do not allow the cows to go out in the Winter at all. In the morning at five o'clock we milk; then feed each cow with a bushel and a half of the prepared fodder. The Ayrshires do not need quite so much. The cows that are in milk receive, in addition, eight quarts of mash made of rye bran and wheat shorts. When this is consumed, they get a half bushel of roots, generally beets. At noon they are fed with the best upland hay, about seven pounds to each cow. At half past four P. M., they are fed with steamed fodder and bran mash, as in the morning.

"We are now milking about one hundred and seventy-five to two hundred quarts per day. The expense of steaming is very trifling. The cows have water in the stalls; it is a very great advantage. They drink fifteen or twenty times a day. When a team comes in at night, they first eat their supper and then drink. The bottom of the barn is cemented, and the mangers are two feet wide, and between each two stalls is an iron box fed by a pipe. The water is brought from the side-hill through a siphon.

"Confinement does not seem to hurt them in the least. They are in excellent health. They are curried almost every day. The ventilation is very good. The stable is above ground, with plenty of light. We steam good hay now, having nothing else left. Wet it thoroughly and mix it. I have never had any trouble with the cotton-seed meal. It never hurt my cattle, though I have fed as much as six quarts a day to a cow. It takes about three-fourths of an hour to steam the food. We use an engine and a small tubular boiler. Our tank is six feet by seven. The hay is put in from the floor above and taken out below. We have about forty head on that floor now. One great advantage in steaming is, that there is no waste whatever. If there is anything left in the mangers, we take it in the basket and put it through another steaming; so that there is no more left on the last day in the Spring than there is on the first day in the Fall. I think one and a half tons of hay to a cow will keep her. We feed no roots but mangel wurzels. It is easy to raise one thousand bushels of mangel wurzels to the acre. I do not think that sugar beets are any more valuable than mangel wurzels.

"Water does not freeze in my barn. The thermometer would not fall below forty-six degrees above zero there. I have purchased cotton-seed meal from different mills. I am now feeding six quarts to the cows which I am fattening. I once fed to a cow for milk, when I wanted a good deal of milk, six quarts of cotton-seed meal, and four quarts of corn meal per day. The feed did not hurt her at all. She did not come out of the stall till Spring and then came out decidedly fat and frisky. She milked well the next year. I like to have my cows fat when they come in. I fed the cow so heavily because I wanted her to make butter enough for the family—and she did. We feed salt in the cut-feed."

GEORGE A. MOORE, at the New York State Fair discussion, 1864, says: "I was feeding sheep, and cutting for them timothy hay, millet, carrots, and feeding with bean and oat meal. Before steaming, I found, by weighing, I was putting on two pounds of flesh per week. After steaming, I put on three pounds per week, and the stock ate the food cleaner, and I noticed they laid down quietly after feeding. I also experimented with sixty-four cows. Used one of Prindle's steamers; had a quantity of musty hay which I cut and steamed. They would eat it entirely up, and seemed better satisfied with it than the sweetest unsteamed hay. Steamed food does not constipate the animal, the hair looks better. I think cutting and steaming combined, insure a gain to the feeder of at least thirty-three per cent. The manure resulting from feeding steamed food is worth double that from feeding in the ordinary way. Have kept eighty head of stock, and had a surplus of food, on a farm where, previously, only fifty were carried through, and hay bought at that. After cows come in, steamed food increases the milk one-third, and the cows do better when put out to grass."

Cutting Food.—The object of mastication of food is to comminute it, to break down its structure, and to render it more easily acted upon by the gastric juice, thus enabling the animal to appropriate its nutriment. Now, the more finely divided food is, when subjected to the gastric juice, the more rapidly and easily it is digested. For, when finely divided, it presents many hundred times more surface to the action of the digesting fluid. This is simply represented in cooking fine meal or whole grain. We know it takes but a few minutes to cook the meal, while hours are required to soften the whole grain.

From this it will be seen that it will generally pay to cut *all* hay before feeding it to cattle; and many farmers contend that it will pay to steam it all, and reduce it, as far as possible, to pulp. The whole effort, in cutting and steaming, is to produce an imitation of nature's green food.

Science and Experience.—The theories of scientists, and the practice of the best farmers, agree that cutting and cooking food for their stock *pays*. REAUMER instituted a series of experiments to determine the rate of increase resulting from cooking different articles of food most commonly used for animals, and found that some of them swelled as follows:

4 pints of oats, after boiling, filled	7 pints.
" barley, "	10 "
" buckwheat, "	14 "
" Indian corn, "	15 "
" wheat, "	10 "
" rye, "	15 "

"Starch," says RASPAIL, "is not actually nutritive to man until it has been boiled or cooked. The heat of the stomach is not sufficient to burst all the grains of the feculent mass which is subjected to the rapid action of this organ. The stomachs of graminivorous animals and birds seems to possess, in this respect, a particular power, for they use feculent substances in a raw state. Nevertheless, recent experiments prove the advantage that results from boiling the potatoes and grain, and partially altered farina, which are given to them for food; for a large proportion, when given whole, in the raw state, passes through the intestines perfectly unaffected as when it was swallowed."

LIEBIG, JOHNSTON, PEREIRA, REGNAULT, BRACONNOT, and other chemists confirm this fact, and boiling hay, straw, and stalks, is quite as beneficial, and for similar reasons.

Stewart's Experiments.—E. W. STEWART, of North Evans, New York, says: "The writer of this paper has practiced cutting and steaming fodder, of all kinds, in Winter, for a stock numbering from ten to fifty-five neat cattle and horses, during the last ten years. He therefore deems his experience sufficient to enable him to speak with some degree of confidence. He tried a long series of experiments, to determine the quantity of middlings or meal necessary to mix with a bushel of straw, to render it equivalent to the best hay. Ten animals of about uniform size, standing in the same stable, were parted—five being fed upon hay, and five upon the mixture. At first, four quarts of mid-

dlings were mixed with a bushel of straw. The animals were fed for one month—five upon this mixture, and five upon the hay. Those fed upon the mixture were found to gain decidedly upon those fed upon the hay alone.

"The experiment was then reversed, putting those upon the mixture that had fed upon the hay, and *vice versa*. At the end of the month, those fed upon the straw and middlings had gained rapidly, while those fed upon the hay had hardly held their condition. Then the experiment was continued by reducing the quantity of middlings one-half, or to two quarts, on which mixture the animals did rather better than those upon hay, while, upon reversing, those at first fed upon the hay when fed upon this mixture did better than those on hay. Upon several trials afterward it was uniformly found that a bushel of straw with two quarts of middlings was quite equal to the same weight of cut hay, and was worth twenty-five per cent. more than uncut hay. It was found that the animals would eat twenty-five per cent. more hay uncut than cut. The same experiment was then tried with corn meal, and one and one-half pints were found to make a bushel of straw equal to hay, though the formula is generally given as a quart to a bushel of straw, which will render almost any quality of straw equal to the same weight of good timothy hay."

Birnie's Experiments.—WILLIAM BIRNIE, of Springfield, Massachusetts, whose stock for several years has consisted of about fifty head of thoroughbred Ayrshire cattle, and five horses, has practiced steaming feed since 1858, and, as he says in a letter to the *Country Gentleman*, "with increasing confidence in its economy." The process and apparatus employed for this purpose, is thus described: "My barn is built on a side-hill, and is three stories in part, the principal story on which the barn floor is situated being level with the ground on the highest side, and used entirely for the storage of hay, grain, etc. The next story below opens on to the barn-yard, and is used for stabling and a root cellar, being under ground at one end. Under a portion of this story is a manure cellar fifty by twenty-eight feet, and eight feet deep, which opens on to a still lower yard.

"On the stable story is located the steam arrangement. In one corner of the underground part is the boiler-room, about ten feet square, made as near fire-proof as possible. The chimney is built of brick, on the outside, against the corner of the barn, and extends about six feet above the roof at that point. The

*In a valuable essay in the U.S. Agricultural Report for 1865.

boiler (tubular) is about the capacity of a four-horse engine. The vat or chest in which the steaming is done, is built of brick and lined with two-inch plank, tongued and grooved, is six feet square inside and eight feet deep, and extends from the stable floor to the barn floor above, with a lid the whole size of the top, opening on a level with the floor. There is also a door four feet square on one side, near the bottom, for the purpose of taking out the feed. The vat steam-pipe passes directly from the boiler to the vat, and extends around the four sides and across the middle, about six inches above the bottom. It is perforated with small holes, about six inches apart, for the escape of the steam. Conveniently located at one side, above the top of the vat, is a cask, which holds about two hundred gallons of water, which is kept full by a pipe connected with an aqueduct.

"The fodder is cut by horse-power on the barn floor, and consists usually of about one-half cornstalks and straw and one-half good hay. It is thrown from the floor into the vat, and thoroughly wet and mixed with a small quantity of meal or bran, according to circumstances, continuing the process until the vat is full, and taking care to tread down well, using as much water as possible, to cause the fodder to absorb as much as it will hold.

"I usually direct my foreman to start the fire in the boiler before he begins to fill the vat, and by the time it is full the steam begins to pass into it. I never attempt to get up much pressure, but let the steam pass into the vat as fast as it is generated, and like to keep it on three or four hours—the longer the better.

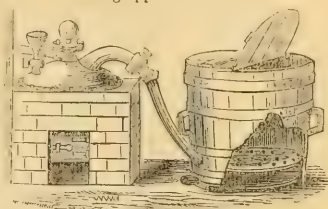
"I feed with the steamed mixture morning and evening, and with good dry hay at noon. When feeding time arrives, the door at the lower side of the vat is opened, and a sufficient quantity withdrawn into a box, and the door closed at once; it is then carried to the cattle in a basket, giving to each about a bushel, less or more, according to size and condition. By the time it reaches the cattle it will be quite warm, but not hot.

"Last Winter I steamed but twice a week, finding no unfavorable effect from keeping the feed so long. This was done to save labor and fuel. Three times a week is better."

Mr. BIRNIE said, in 1868: "I am satisfied that I save more than twenty-five per cent. by steaming food."

Steaming Tub.—We are indebted to "The American Farm Book," by R. L. ALLEN, editor

of the *Agriculturist*, for the accompanying cut of a small boiling apparatus:

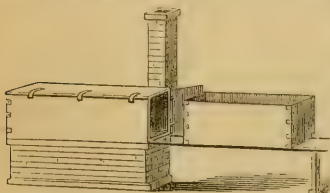


This cut will be understood without description. Fifteen bushels of Indian corn can be cooked in the tub, and fifty bushels of hay, roots, and fodder can be steamed in a separate box at the same time.

A Cheap Steaming Apparatus.—Mr. STEWART gives in his essay, this description of a cheap and simple apparatus, that is within the reach of every farmer. Get a sheet of No. 16 iron, thirty-two to thirty-six inches wide, and seven or eight feet long (or two sheets may be riveted together, and thus make one fourteen feet long, if much work is to be done). Take two-inch maple plank about two feet wide; let the sides extend three inches past the end plank; make a box a little flaring at the top, and wide and long enough so that the bottom sheet will cover and project half an inch on each side and end. Let the ends into the sides one-fourth to three-eighth inch in making the box, and put it together with white lead and oil, and put two three-eighth inch iron rods through the sides at each end, outside of the end plank; then nail on the bottom sheet with two rows of five-penny nails, the nails about one inch apart in the rows, and breaking joints, and bend up the sheet where it projects. This will hold some thirty bushels. Now take flat stones or bricks, and make a fireplace the length of your box, and eight inches narrower on the inside than your box is wide on the outside. Fire bed should be sixteen or eighteen inches deep. Put across at each end a flat bar of iron, one-half by one and a half inch, so as to lay a row of bricks on these for the ends of the box to rest on, and at the back end let the arch run out so as to build a small chimney, and put on some joints of stove-pipe, and you have a cooking apparatus. This is a good boiling arrangement, where only water or some thin liquid is to be heated; but if hay or straw, or even potatoes are to be boiled with little water, as would be the case, especially in steaming fodder, it would

settle and burn on the bottom. This difficulty can be obviated entirely, and a good steaming apparatus be made of it by placing a false bottom one inch above the real bottom, in the following manner: Take a sheet of No. 18 iron, of the size of the box, or perhaps one-half inch wider; have this punched with small holes, so as to let the water down and the steam up. It can be let into the side of the box, or a half-inch cleat can be nailed on the side and end of the box for it to rest on. This would not sufficiently support the weight of feed to put on it, and, therefore, three-eighth-inch rods must be put through the sides, under this false bottom, to sustain it—one, perhaps every foot. Then a wooden or iron faucet must be put through the side between these bottoms, to draw off the water. Now a wooden cover on the top of the box to keep the steam in, and here is as complete, effectual, and cheap a steamer for cooking without pressure, as can be desired. The whole apparatus would not probably cost over twenty-five dollars for the seven feet, or fifty dollars for the fourteen feet length. This will be sufficient to feed fifty to seventy-five head of cattle and horses.

The accompanying cut represents a cheap steam boiler, easily made by any farmer, aided



by a tinner. It nearly explains itself. The box has a false wooden bottom, elevated three inches above the sheet-iron bottom, and on this the roots rest. This is perforated, and most of the water is below it. The box may be made on rollers to run out on a tramway to receive and deposit its load.

Summary of the Advantages of Cooking.—We quote again from Mr. STEWART's essay:

1. It renders moldy hay, straw, and cornstalks, perfectly sweet and palatable.* Animals seem to relish straw taken from a stack which has been wet and badly damaged for ordinary use; and even in any condition, except "dry rot," steaming will restore its sweet-

ness. When keeping a large stock we have often purchased stacks of straw which would have been worthless for feeding in the ordinary way, and have been able to detect no difference after steaming, in the smell or the relish with which it was eaten.

2. It diffuses the odor of the bran, corn meal, oil meal, carrots, or whatever is mixed with the feed, through the whole mass; and thus it may cheaply be flavored to suit the animal.

3. It softens the tough fiber of the dry cornstalk, rye straw, and other hard material, rendering it almost like green succulent food, and easily masticated and digested by the animal.

4. It renders beans and peas agreeable food to horses, as well as other animals, and thus enables the feeder to combine more nitrogenous food in the diet of his animals.

5. It enables the feeder to turn everything raised into food for his stock, without lessening the value of his manure. Indeed, the manure made from steamed food decomposes more readily, and is therefore more valuable than when used in a fresh state. Manure made from steamed food is always ready for use, and is regarded by those who have used it as much more valuable, for the same bulk, than that made from uncooked food.

6. We have found it to cure incipient heaves in horses, and horses having a cough for several months at pasture, have been cured in two weeks on steamed feed. It has a remarkable effect upon horses with a sudden cold, and in constipation. Horses fed upon it seem much less liable to disease; in fact, in this respect, it seems to have all the good qualities of grass, the natural food of animals.

7. It produces a marked difference in the appearance of the animal, at once causing the coat to become smooth and of a brighter color; regulates the digestion, makes the animal more contented and satisfied, enables fattening stock to eat their food with less labor, and consequently requires less to keep up the animal heat, gives working animals time to eat all that is necessary for them in the intervals of labor; and this is of much importance, especially with horses. It also enables the feeder to fatten animals in one-third less time.

8. It saves at least one-third of the food. We have found two bushels of cut and cooked hay to satisfy cows as well as three bushels of uncooked hay, and the manure in the case of uncooked hay contained much more fibrous matter, unutilized by the animal. This is

*But it should be remembered that cooking weedy hay and moldy cornstalks, and thus making them palatable and coaxing poor cattle to eat them, will not make up for a lack of nutritious food.

more particularly the case with horses. The cooking of hay and straw destroys all foul and troublesome seeds.

It may be added that cooked food, being usually fed out warm to animals, contributes to their comfort and thrift. Everybody knows that warmth of itself greatly promotes the flow of milk. A warm spell of weather in Winter often increases the milk in a dairy twenty per cent., and a cold snap will as suddenly diminish it. Three hours shivering in a cold wind, after drinking a couple of buckets of ice water, will almost stop the secretion of milk in a cow.

Experience in the West.—Many Western farmers have adopted the practice of cooking, generally with favorable results. JARVIS HARMEL, of Richmond, Indiana, reports: "In the Fall of last year (1868), I began feeding twenty-one head of three-year-old steers. In addition to some oil cake and rough food, I gave them, daily, the meal from six bushels of corn. I tried cooking the corn without shelling it—my apparatus costing one hundred and fifteen dollars. I am perfectly satisfied with the result. I first tried feeding three bushels a day, and found it was too much. For three weeks I fed but two bushels and a half a day; since that time I have fed but two and three-quarter bushels, instead of the meal from six bushels of raw corn. With my apparatus the trouble and expense of cooking are less than the shelling of the corn used to be, and I save the toll. I build a fire in my furnace at night and put in my corn; the next morning it is in the finest condition for feeding. I can cook over four hundred bushels of corn on the cob with one cord of wood. From my experience I am well satisfied there might be a net saving of one-third of all the corn fed in this country by cooking it. My cattle have disposed of all their long, rough hair, and are now smooth, sleek, and in fine condition."

Loss by Raw Feeding.—If we take the amount of grain and Indian corn raised in the United States, by the census of 1860, we shall find, by allowing forty bushels of grain to the ton of straw or corn fodder, that there were of the latter about 30,000,000 of tons. Now, at least one-third of this is wasted for every purpose except manure, and vast quantities not even used for that. Suppose we estimate this at one-half the value put upon it by Mr. MECHI, or five dollars per ton, and we have the enormous sum of \$50,000,000 wasted, for want of proper economy, in a single year. We believe this estimate much below the real loss. These

facts are worthy of a thorough examination by the farmers of the whole country. Let them study their own interests. Many of them will see where they have thrown away enough in ten years to double their property.

Cost of Feeding.—Judge FRENCH, of Exeter, New Hampshire, says: "My own estimate is that two tons of good hay, fed dry, will keep an average cow through the six months of Winter. If she is giving much milk, which by the way, she will not do on dry hay alone, a cow will consume nearly that amount of hay with a bushel of roots, and four pounds of shorts or corn meal daily."

Hon. GEORGE S. BOUTWELL, now Secretary of the United States Treasury Department, makes the following statement: "In December, 1868, I fed the following cattle in the manner described:

14 cows and heifers in milk,	
1 bull three years old,	
1 " " two " "	
8 heifers from six to twenty months old,	
1 horse.	

"In all twenty-five animals, estimated equal to twenty-two cows. Fed as follows:

340 pounds corn fodder, at \$10 per ton.....	\$1 70
85 pounds meal, corn, and cob, at \$10 per ton	1 70
120 pounds hay, at \$20 per ton.....	1 20
3 bushels turnips, at 22c. per bushel.....	75
	\$5 35

"Equal to twenty-four and one-third cents each per day, or about one dollar and seventy-one cents per week. Upon this basis, the cost of keeping a cow a year would be:

Winter, 26 weeks, at \$1 71.....	\$44 66
Summer, 26 weeks, at 80c.....	13 00
	\$57 66
To which should be added for interest upon value of cow and depreciation.....	12 00
Cost per year.....	\$69 66

"Eight of my cows were four years or over in the Spring of 1868, and these have given during the year an average each of 4,723 pounds of milk, or 278 cans of 17 pounds each. During the Summer months the price per can was 27 cents, and in the Winter 39 cents, or 33 cents for the entire year—equal to \$91 74 per cow. This statement shows a balance to the credit of each cow of \$22 08.

"I have made no estimate for the care of the animals, barn rent, or value of manure produced. The corn fodder was cured in the stook, cut in a machine, placed in a close feed box, saturated with water at boiling point, mixed with meal, and then fed in ten or twelve hours after being thus prepared. Twice a day the animals are fed upon corn fodder, a meal consisting of 170 pounds of corn fodder and one-half the meal."

Mr. BIRNIE gives his method of feeding during the Winter of 1868-9. He fed forty-three head of neat stock, three horses and six colts—the whole deemed equal to forty-three mature animals. Enough coarse hay, with some meal, was steamed at once to last three and a half days, and the statement is given as follows:

1350 lbs. poor hay, at \$12 per ton.....	\$8 10
112 lbs. bran, at \$1 70 per bushel.....	1 90
44 lbs. cotton-seed meal, at \$2 25 per bush.	99
<hr/>	
Total cost of steamed food for 3½ days.	\$10 99
<hr/>	
Cost for one day steamed food.....	\$3 14
Extra meal for 3 horses—21 pounds.....	60
Extra shorts for 20 cows—70 pounds.....	1 19
12 bushels of roots at 18. per bushel.....	2 00
170 pounds of hay, at \$20.....	1 70
<hr/>	
Daily cost of feeding 43 animals.....	\$3 63
<hr/>	
Average cost, 20 cents.	

The "extra" meal and shorts are not cooked, but are added in the manger, and the 12 bushels of roots are fed raw, and so are the 170 pounds of good hay.

The weight of fodder consumed by Mr. BIRNIE's animals is very small, only a small fraction above 16 pounds a day each, besides 12 bushels of roots, equal to 600 pounds, or 14 pounds to each of 43 animals. Of the 16 pounds given each animal, about 3 1-5 pounds is meal or shorts, which costs about twice as much per pound as good hay, and is equivalent in nutriment to double its weight in good hay.

Oil Cake.—One of the most valuable of all artificial foods is linseed and cotton-seed meal. Of the latter there are two kinds that have been used, the difference arising from the manner in which they are prepared. The one called the decorticated meal is made from the kernel of the seed only, the husk or hull having been stripped off by machinery before grinding; the other is made of the whole seed. The difference in the composition of the two is very great; the decorticated meal contains sixteen per cent. of oil—more than any other description of meal—while the whole-seed meal contains only six per cent. The proportion of albuminous or flesh-forming matter in the decorticated meal amounts to forty-one per cent.; in the whole-seed meal it is only twenty-three per cent.—about one-half. So with respect to the other constituents; the proportion of woody fiber is much larger in the whole-seed meal than in the other. The husk in the whole-seed meal was for a long time a great impediment to the general use to which cotton-seed meal ought to come, and probably will come, in this country. It is richer than meal from linseed, and obtainable at a much less rate. The difference between the kinds of meal is so great that

probably one ton of the decorticated meal will go as far as two tons of the whole-seed meal.

This oil cake costs forty to sixty dollars a ton. It is richer than any other food for stock. It has from six to sixteen per cent. of oil, and its value depends greatly on the proportion retained. It is also peculiarly rich in flesh-forming materials. More than four-fifths of these matters are found again in the dung. The condition of cotton meal is very much determined by its color—when fresh, being as yellow as mustard.

GEORGE F. A. SPILLER, of Somerville, Tennessee, recommends feeding the unground cotton-seed. He says: "It is fed to the cattle in the raw state, as it comes from the gin. There is *no danger* whatever in feeding it to cattle in its unhulled state. I feed it to my cattle at least once a day, and often three times a day, with the most satisfactory result. I sometimes sprinkle a little salt over it, and at other times mix a little meal in it. In addition I feed liberally with fodder or husks. Most farmers in this section hardly feed anything else to their milch cows but the raw cotton-seed. It is highly improved by boiling for a few hours, making an excellent slop, which increases the flow of milk and enriches the butter. In fact the cow we are milking now has been kept from going dry by giving her cotton-seed slop, warm. Cotton-seed when *fed alone* to milch cows, produces a very white kind of butter, not of the best flavor. But an addition of corn meal or wheat bran, or field peas, or even oats, will correct this, and impart to the butter an excellent flavor. A cow will hardly consume more than two bushels of seed a week, which can be bought here for a pound of butter."

Cotton-seed is ordinarily cast aside to rot, or thrown into the rivers and bayous of the South to be got rid of, so that every dollar it can be made to net the planter is so much addition to the profits on the cotton itself. In Egypt it sells at a higher price than wheat.

Oil cake is especially valuable for the resulting manure. There are those who think manure is manure, no matter from what it is produced. This is not the case. A ton of manure made from clover hay is worth twice as much as a ton made from straw. Some manure is ten times as valuable as other manures. From numerous analyses and from actual experiments, J. B. LAWES, of England, estimates the manure made by the consumption of a ton of food as follows:

Description of Foot.	Estimated money value of the manure from one ton of each foot.
1. Decorticated cotton-seed cake.....	\$ 7 56
2. Rape cake.....	21 01
3. Linseed cake.....	19 72
5. Malt dust.....	18 21
6. Linseed.....	16 51
7. Tares.....	15 65
8. Beans.....	15 75
9. Peas.....	13 38
10. Locust heads.....	4 81
11. Oats.....	7 40
12. Wheat.....	7 08
13. Indian corn.....	6 65
14. Malt.....	6 65
15. Barley.....	6 32
16. Clover hay.....	9 66
17. Meadow hay.....	6 43
18. Oat straw.....	2 90
19. Wheat straw.....	2 68
20. Barley straw.....	2 25
21. Potatoes.....	1 50
22. Mangel wurzel.....	1 07
23. Swedish turnips.....	91
24. Common turnips.....	86
25. Carrots.....	66

Soiling.—In its European sense, soiling cattle means the practice of supporting them in the Summer season with green food from crops sown from month to month, cut daily, and fed in the stall or yard. An experiment was made by a member of the Royal Academy of Agriculture of Prussia, extending through seven years, to test the comparative merits of soiling (stable feeding) and pasturing. The pasturing averaged 1580 quarts per cow, per year, for the whole seven years; and the average of the soiling plan, for the same time, was 3,442 quarts per cow; the cows in both cases being about the same in natural production of milk.

In a late communication to the British Board of Agriculture, it is stated that thirty cows, one bull, four calves, and five horses, were fed through the Summer from fifteen acres of clover, sown the preceding year. The labor of two men and two women was sufficient to tend them, and the net produce of the season, in butter, from June to October, was £19 10s., nearly \$90 from each cow.

The Zoarites, a religious sect of Germans, on the Muskingum river in Ohio, keep their milch cows constantly in the stall, and obtain an extraordinary yield of milk. There is no doubt that, with judicious soiling, a greater number of cows can be kept on a given number acres, with a larger yield of milk than from any pasturage. In soiling, one acre per cow will be found sufficient with land in average condition; a half an acre per cow will be sufficient under the highest care and industry. In the soiling system may be found the solution of the "fence" problem.

JOSIAH QUINCY, Jr., has been very successful in keeping cattle in stables the year through, and feeding them by soiling. A hundred acre farm, by this means, has and needs no interior fence. The amount of manure thus made had

enabled him to improve the fertility of a poor farm, so that in twenty years the hay crop had increased from twenty tons to three hundred. His animals are healthy, and he scarcely ever had a sick one. In a well arranged stable, this mode is attended with very little trouble. The cattle are let out into the yard an hour or two, morning and afternoon, but they generally appear glad to return to their quarters. With this management an acre will support three or four cows, enabling him to keep much stock on little land.

The materials he uses for the feed are grass, oats, corn, and barley, cut green. He begins with grass, which lasts nearly to midsummer. Sows the first crop of oats very early in Spring, four bushels per acre; the next, half a month later, and the third nearly two weeks later. These furnish food during July and August. In early corn-planting time, he sows Southern corn, and again twice, after intervals of three weeks each. These supply food through more than half of Autumn. Several sowings of barley are made in Summer, about ten days apart; which give plenty of food until the digging of roots, when the tops are fed. English writers think seven cows may be kept by soiling for one by the old plan.

It is said that one man will take care of and feed fifty cows. A large supply of carrots for Spring feeding would be valuable; and clover for early Summer would doubtless be better than grass. Corn sown in furrows three feet apart, at the rate of three bushels per acre, and cultivated (not hoed) once, will yield twice or thrice as much feed per acre as good meadow.

But this practice will not be largely adopted in America, at least in the West, as long as labor is so dear and pasture so cheap. Soiling, as used among us, has come to mean, chiefly, the feeding of green fodder of corn, rye, clover, lucerne, cabbage, kohl rabi, etc., to fattening cattle in stalls, or to cows, to keep up the flow of milk during the Fall transition from grass to hay. Dairymen should remember that sowed corn, as Fall feed for milch cows, has received the endorsement of the majority of the profession for years. It is grown with the greatest ease, and yields most profusely. It is rich, succulent, and consequently just the thing for cows at the time when pasture begins to fail in the Fall. It should always be sown in drills—never broadcast—for twice as much to the acre can be grown by drill culture.

The following is a good method: Make the ground mellow by plowing and harrowing;

furrow with a small plow three feet apart; twelve varieties of grasses for permanent pasture common, or, better, sweet corn from a half-bushel hand-basket along the furrows, at the rate of thirty or forty grains to the foot, or three bushels per acre; cover by harrowing, or running a cultivator lengthwise, and the planting is completed. Plant three or four times during the early Summer. Pass the cultivator two or three times while it is growing, and cut, before it tassels, with a scythe or corn cutter. It may be fed in the Fall (being first slightly wilted) and what is left over should be saved for Winter, for cows relish it better than almost any other food.

It does best if bound in bundles, put in large shocks, and suffered to remain some weeks, when it may be drawn and stacked, or it may remain in shocks till fed in Winter. If stacked, the stacks must be small and *well ventilated* by placing three rails or poles vertically in the center, a few inches apart, thus leaving an opening up which the steam shall escape. If stacked in the common way, it will ferment and spoil, even if apparently well dried. Good soil will yield three to six dried tons per acre. It should invariably be cut fine, moistened, and slightly salted, before feeding; then it will produce more Winter milk and butter than any other fodder.

For constant soiling, Winter rye is the first, in our climate, which will come to a sufficient height for cutting—we will say by the 20th of May. At first the cows eat it with avidity—particularly if wilted before it is placed before them; for this reason, it would be advisable to sow an acre or more of rye in later September—but not too much; so soon as the crop becomes rank, it grows distasteful to the cows, and the flow of milk falls off. The next cutting which can be depended upon, is clover, or—still better—lucerne. "Though very liable to be winter-killed," writes DONALD G. MITCHELL, "I am able to affirm from my own experience, that lucerne will give two, three, or four cuttings in the season—that cows prefer it to any other forage plant that can be set before them, and that no one tells so immediately and effectively upon the flow of milk."

The WELLS brothers, of Connecticut, maintain the flow of milk in the Fall with corn fodder, cut rowen, and green rye—the latter sown in August, three bushels to the acre.

Mixture of Grasses.—MR. FLINT, Secretary of the Massachusetts Board of Agriculture, in his works on "Milch Cows," and on "Grasses and Forage Plants," recommends a mixture of

twelve varieties of grasses for permanent pasture, and thinks that no improvement in grass culture is more important than the mixture of grasses. The varieties most likely to give satisfactory results, as a mixture for permanent pastures, dependent to some extent on the nature and preparation of the soil, as suggested by Mr. FLINT, are as follows: Meadow foxtail, orchard grass, sweetscented vernal, meadow fescue, redtop, June grass, Italian rye grass, perennial rye grass, timothy, rough-stalked meadow grass, perennial clover, and white clover. For mowing lands, he would leave out entirely the meadow foxtail and sweetscented vernal, and increase the quantity of timothy and red clover.

Animals Apt to Fatten.—HEADLEY, an experienced cattle observer, informs us that the lean cattle that have broad, full and capacious skulls, with strong, evenly bent horns, a thick neck at the base, and a wide breast, invariably possess a strong, nervous system, and the greatest aptitude to fatten early and quickly; while those cattle that have long, narrow, and contracted skulls, and puny and abruptly bent horns, will be characterized by weakness, wildness, and slowness to fatten. He furthermore says: A small, dull, sunken eye, betokens hardness of "touch," and inaptitude to fatten; and a bright, large, and open eye the reverse.

Roots, etc.—All first-rate farmers understand the value of roots for stock. Their relative value has already been treated, in this article and under the head of "Field Crops." Good hay is not "good enough for anybody's cows," if a few roots daily will make the hay go much further, make the cattle do much better, and their aggregate keeping cheaper. Cattle will Winter well on turnips with steamed straw and cornstalks, without a mouthful of hay or grain. Roots that have been reduced to pulp with a machine will feed more economically and effectively.

Carrots and mangels are the best roots to feed to milch cows. The latter will keep well into the Summer, the warmer the weather, the better becomes their fattening quality. Carrots are the best Winter food for milch cows, where the production of good, rich butter, like that from grass, is the main object; while field beets will yield more milk.

Turnips are objected to because they leave a "turnip taste" on milk and butter. This may be entirely avoided by feeding them only immediately after milking. (So cabbages and even garlic may be eaten with impunity during the

forenoon). Milk may be divested of the turnip taste by putting into each pail of fresh milk one pint of boiling water—most effective when a little niter is added. Some dairymen will need to resist the temptation to add more than a pint.

Parnsips contain six per cent. more mucilage than carrots, and are more fattening. Indeed, they are considered superior to carrots, but are not so easily grown.

Eleven thousand heads of cabbage, says the *Valley Farmer*, may be raised from an acre. These, sold at five cents, will bring five hundred dollars. It is said by those who have raised cabbages extensively, that this is one of the best crops to feed stock—young stock and cows particularly.

In Europe, the kohl rabi, a fine vegetable, intermediate between the cabbage and turnip, is extensively grown for stock, are thought to keep better than the turnip. *MORTON'S Cyclopædia* says: "Kohl rabi is the bulb of dry *Samers*; heat and drouth are congenial to it, and it prospers and yields an enormous crop under circumstances wherein white turnips and Swedes could barely exist. It bears transplanting better than any other root; insects do not injure it; drouth does not prevent its growth; it stores quite as well, or better, than Swedes; and it affords food later in the season, even in June." Cattle are very fond of it.

VALENTINE HALLOCK writes from New York: "I also proved by experiment, this Winter, that fat cattle will grow faster on eight quarts of grain and one bushel of ruta bagas, than on sixteen quarts of grain and no ruta bagas." A correspondent of the *Illinois Farmer* says: "In feeding store cattle I should commence with Swede turnip, proceed with the orange-globe, then with the mangel wurzel, and finish off with the sugar beet; thus not only frequently varying the food, but using them in the order corresponding exactly with the nutritive matter contained in each."

Salt for Stock.—All neat cattle find salt in the hay, grain, and roots which they receive; nature has secreted from one to ten pounds in every ton of vegetation—the amount varying according to location. Those that are kept within twenty miles of the sea-shore get, perhaps, all that they need in the crystal deposits on the herbage, and the saline particles with which the winds come laden. A few insist, indeed, that salt is unnecessary for any stock anywhere; that the natural supply is sufficient. This number is small, however.

Salt operates both as a tonic and a gentle laxative. It regulates the stomach and bowels, favors the formation of bile, improves the hair or wool, keeps up the tone of the system, and gives an edge to the appetite. Cattle may eat too much salt, as of anything else, but they will seldom take it in excess if it is kept constantly near, so that they can satisfy their natural cravings. LIEBIG says: "Salt does not act as a producer of flesh," but he thinks that the flesh of cattle that have received salt while fattening is better, and concludes that "the advantages attending its use can not be estimated too highly." The free use of salt is certainly a valuable preventive of the spread of infectious diseases.

In Great Britain, in the best farmed districts, we find the allowance of salt oscillating around the subjoined figures, taken as a basis:

ALLOWANCE OF SALT PER DIEM.

Calf, six months old.....	1 ounce.
Bullock or cow, one year old.....	2 "
Oxen, fattening.....	3 "
Milch cow.....	4 "
Horse.....	2 "
Sheep.....	2 "
Pig, full-grown.....	2 "

An excess of salt produces irritation and inflammation of the mucous membrane, and causes several kinds of skin disease, especially in sheep. With horses an excess of salt has been known to produce dysentery, and in oxen diseases of the blood. Salt should never be given to cattle when a deficiency of food does not enable them to receive abundance of nourishment; in which case we excite appetite without satisfying it, and the animal loses flesh rapidly.

OLON ROBINSON says that cattle can be most economically and conveniently supplied by leaving a large lump of rock salt in a manger, where they can lick it.

Fresh wood ashes should also be left where all the stock of the farm can occasionally get a taste of it.

Brief Suggestions for Feeding.—Corn for fattening animals, and maintaining animal heat, during cold weather, excels all other grain. But it is not adapted to feed to stock of all sorts, for it requires strong digestive powers, and oats, peas, beans, and roots, a diet rich in bones and muscle, are better for young and growing animals. A generous diet of corn meal, unassisted by roots, is almost certain, in the long run, to injure the health. Nothing is better than corn meal to "finish off" on; and in the West, where it is abundant, it will be used instead of oil cake.

A daily feed of three pecks of roots and

three quarts of corn meal, will do an animal much more good than a peck of meal without roots, while they will generally be cheaper.

In fattening beef cattle with corn meal, never feed so high that you can see or smell the effect of it in the excrements, for if you do you may be sure you are losing your feed, as the cattle do not assimilate all the nutriment there is in the grain.

In feeding with corn, sixty pounds of meal goes as far as one hundred pounds in the kernel.

There are few really good feeders. It requires both judgment and strict attention. The farmer who throws out a pile of hay and turns his back upon the barn will never have nice cattle. He should stop and see if they all take hold of it. If there is one that fails to fill itself, a little extra pains should be taken to "set it up" again, with a special feed of roots or grain. Feed little and often.

Never feed a cow while she is being milked.

"Potatoes are worth more, for all kinds of stock, than most farmers think they are. If you can have them frozen," says a farmer, "and then cooked before they thaw, the starch is changed to sugar, and I know of no food that will fatten faster, or give a better flow of milk."

A correspondent of the *Ohio Cultivator* gives the following preventive of winter-killing in cattle, hogs, and sheep, many often dying during Winter and early Spring:

R.—Good shelter—um, q. s. (*quantum sufficit*).
Corn meal—um, q. s.
Clear water—um, q. s.

The "*corn meal-um*" to be made into a poultice, and to be kept constantly applied to the mucous membrane of the stomach. For the benefit of strictly professional men, the above may be given as follows:

R.—Refug. opt., q. s.
Zea pulv., q. s.
Aq. font., q. s.

Every farmer should reserve his best hay for the latter part of Winter and Spring. Let the animals rather improve instead of their falling away as warm weather advances. Let them enter the pasture in good condition. It is an old axiom, "cattle well-wintered are half-summered."

"If you desire to get a large yield of rich milk, give your cow three times a day water slightly warm, slightly salted, in which bran has been stirred at the rate of one quart to two gallons of water. You will find, if you have not found this by daily practice, that your cow

will gain twenty per cent. immediately, under the effect of it, and she will become so attached to the diet as to refuse to drink clear water unless very thirsty, but this mess she will drink almost any time, and ask for more. The amount of this drink is an ordinary water pailful each time, morning, noon, and night."

Cows sometimes get a surfeit of grass, especially in wet, warm weather, when the grass is succulent and rich. This feed distends the bowels uncomfortably. An armful of dry hay once a day will serve to absorb some of this moisture, and benefit the cow in several respects.

Feeding animals should be commenced early in the season, because the same amount of food will then make more flesh than when the weather becomes colder.

Squashes and pumpkins cut fine, furnish an excellent feed for milch cows, and even for fattening purposes. But the seeds should always be removed; if they are retained the quantity of milk will not be increased. Pumpkin-seeds have a decided diuretic (urine producing) effect, and they must be removed before the pumpkin can be profitably fed.

If straw is stacked as well, as hay is, with salt scattered through it at the rate of one peck to every foot in height, cattle will eat it with avidity, however they may be fed. But it is better to cut it. According to the analysis of Dr. CHARLES A. CAMERON of Ireland, oat straw contains one-half as much nutritive aliment as oil cake, pound for pound.

Stock will thrive best with just as much food given as they will eat up clean.

THE HORSE—VARIETIES, CARE, AND DISEASES.

Varieties of the Horse.—The horse seems not to be a native of the Western Continent, as has been already intimated. The principal varieties which now prevail in the United States are the thorough-bred or race-horse; the Arabian; the Norman; the Morgan; the Cleveland Bay; the Dray; the American Roadster; and the mongrel known as the "common horse," too doubtful in parentage and too infinite in kind to admit of any description.

The Racer (Runner).—The horses known as thorough-breds trace their lineage back to some well-known European racer or beyond, till it is lost in oblivion. The standard Stud-

book refers all the old racers to an Eastern origin—generally Arabic, Turkish, Barb, or Persian. The modern English race-horse is a well-marked animal, and is generally derived from a judicious mixture of the best Eastern horses, though a few of the best racers, have been without ancestry. The figure of a racer indicates swiftness, which, in the case of Fashion and Flying Childers, reached four miles in seven and a half minutes. Firetail ran a mile, in 1772, in one minute and four seconds. In 1786, Quibbler ran twenty-three miles in fifty-seven minutes.

Professor Low observes that the form of the racer corresponds to the conditions required, but that "his length is greater than consists with perfect symmetry, the power of speed having been sought for in greater degree than that of strength and endurance. His legs are longer and his trunk smaller than the eye indicates as strictly graceful. The length and depth of the hind-quarters, a point essential to the power of making long strides, are extended to the degree of appearing disproportionate. The chest is narrow, and the fore-quarters light, a point likewise characteristic of speed. The neck is straight rather than gracefully arched, and the pasterns very long and generally oblique." It is the opinion of the best informed, that this breed is now beyond the Arabian, and can be improved only by judicious selections and intercrossing. There are few thorough-bred racers in America, as trotting is much more popular here.

The Roadster (Trotter).—The American trotting horse was derived in part from the racer. The properties so obtained are nervous energy, spirit, or courage, and elasticity of movement. In reference to this combination of blood, the remarks of the distinguished veterinarian and author, W. C. SPOONER, are worthy of notice. He says: "We obtain from the thorough-bred horse the small head, lengthy (hind) quarters, powerful thighs, and extended stride; but it is from the Norfolk trotter, the old English hunter or hack—descendants to some extent of the ancient Spanish horse—that we derive the oblique shoulder, elevated withers, good forehead, safe walk, and fast trot, accompanied by a larger and wider frame, greater bone, and more powerful digestive organs than the blood horse generally possesses. When once these varied qualifications are combined, it is a *fact accomplished*—the means in our hands for continued excellence, by which we can impart to the next generation the requisite amount of

breeding without that risk of weediness which so often attends the first cross."

Yet some of the very best trotters ever produced on this continent, like Lady Suffolk and Dutchman, are without known ancestry. By careful breeding and training for the course, the United States has produced the fastest trotters in the world. There are probably more horses in this country that can trot a mile within 2.40 than there are in all Europe. The best English authorities concede our superiority in this respect. Our food, air, breeding, and training for this definite purpose, combine to effect the result.

The Morgan horses of Vermont are the only American horses that can properly take rank as a distinct breed. They class as roadsters, with some of the qualities of draught horses. They are fourteen to fifteen hands, bay, short and round, small heads, deep chests, fore legs set wide apart, strong backs, docile and tractable temper, good wind and bottom. They are spirited, with good action and form, and admirable roadsters and carriage horses.

The original Morgan stallion was reared by JUSTIN MORGAN, of Randolph, Vermont, and was sired by True Briton or Beautiful Bay; he by Traveler, and among the ancestors of the latter were probably Eclipse, Flying Childers, and the Godolphin Arabian.* The dam was a light bay of the Wild Air breed, but probably not thorough-bred. A marked improvement results from grafting the best Morgan characteristics on a larger horse, like the Messenger stock.

The Blackhawk is a scion of the Morgan, the first of the branch, owned by Mr. MATHEWS, of New Hampshire, having been sired by the Sherman Morgan. His dam was a three-quarter blooded English mare, that could trot under three minutes. The Blackhawk is one of the best proportioned and most spirited and graceful roadsters that this country has yet produced—a great favorite for the buggy and the saddle.

The Percheron Normans are a pure race, capable of reproducing their qualities indefinitely, without deterioration or intermixture. They sprang from the splendid war-horses of Norman WILLIAM and CŒUR DE LION, and are still the heavy draught horses of France. Some of them have been introduced into New Jersey. They are enormous, shaggy, bony, short, with steep rump, broad quarters, wide chest, heavy muscles and large iron-like feet. They get

* See YOUTT and SPOONER.

their spirit from the Andalusian, and are said to be a capital race for hard work and scanty fare.

The *Canadian horses* are a distinct family, originating in the Percheron Norman. Their characteristics are extreme hardness and unusual shagginess, broad forehead, clear and bold eye, broad chest, strong shoulder, a stout barrel, good loins, muscular thighs, and the soundest, flattest-boned legs, and toughest and hardest feet to be found in any race.

The *Cleveland Bay* is the original of the English coach, hunter, and hackney horses, and many of the best American dray horses. Mr. SPOONER says: "Cleveland Bays were imported into western New York, a few years since, where they have spread considerably. They have often been exhibited at our State Fairs. They are monstrously large, and, for their size, are symmetrical horses, and possess very respectable action. * * * The half-bloods, the produce of a cross with our common mares, are liked by many of our farmers. They are said to make strong, serviceable farm beasts—though rather prone to sullenness of temper."

SANFORD HOWARD, of Boston, subdivides the different breeds in reference to certain special purposes, as follows:

"1. For long distances, with heavy weight on the back, at a galloping pace, the true Arab is the best model; for short distances, with light weight, at the highest practicable rate of speed at the galloping pace, the English racer is preferable; for hunting, a more substantial horse, with greater weight and heavier forehead than the racer is required.

"2. Of trotters, for quick driving, in light vehicles, the roadster best meets the requirements; the best American horses of this description being probably superior to any in the world, certainly superior to the English. For city coach-horses, less speed and hardness being needed, an animal of more size is called for; a purpose for which the Cleveland bay, or a mixture of the racer with some larger-sized stock, answers well. For omnibuses and horse-railroad cars, a more muscular horse, able to endure hardship, is preferable, the French Percheron being well adapted to the place.

"3. Of horses, the uses of which only require a walk, and where heavy burdens are to be drawn, a conformation more adapted to strength and less to speed is necessary. For heavy draught, some of the English and Scottish breeds are best; for farm work, where

horses only are used, and for the drays, carts, etc., of cities, the Suffolk and Clydesdale breeds would be preferable to the horses now generally used for these purposes in this country."

In America, we have little use for the race-horse (the runner), with his low fore-quarters and elevated and expanded hind-quarters, built like the hare, because moving like the hare, by a succession of bounds. Eclipse was taller at the rump than at the shoulder or withers. In this country the public taste prefers trotters, which, instead of springing simultaneously with both hind legs, works the legs about equally, and so require a more equal distribution of muscular power before and behind. Our road distances average thrice as long as in England or France; so we require more speed and more endurance—fast walkers being what we should especially seek. Our horses need to be bred on a radically different model from the foreign types; the best breeds which have been adopted, should now be carefully and scientifically adapted.

The average American wants a horse of all work; one that can go on the road and not leave him behind his neighbor; that can draw his produce to market, and as much of it as it is reasonable for any horse to draw; that can carry his family to meeting, his grist to mill; or grind cider or saw wood; one, in short, that can turn his feet and his muscles to anything and everything that comes within the range of muscular power to perform. He wants a horse that will pay his way in almost any given direction; and he does *not* want a pet, to eat its head off in pampered idleness.

In general, and especially for roadsters, and draught-horses, it is better to keep the varieties distinct, breeding each in reference to an ideal or standard, combining the points which, according to mechanical principles and practical observation, denote the highest adaptation to their different purposes. In crossing different stocks, experiments should be conducted with great care, the object being kept in view to combine and perpetuate the valuable properties of sire and dam.

To Ascertain a Horse's Age.—The teeth are covered with a polished and exceedingly hard substance, called the enamel. It spreads over that portion of the teeth which appears above the gum, and not only so, but as they are to be so much employed in nipping the grass, and gathering up the animal's food, and in such employment even this hard sub-

stance must be gradually worn away, a portion of it, as it passes over the upper surface of the teeth, is bent inward, and sunk into the body of the teeth, and forms a little pit in them. The inside and bottom of this pit being blackened by the food, constitutes the mark of the teeth, by the gradual disappearance of which, in consequence of the wearing down of the edge, we are enabled, for several years, to judge of the age of the animal.

"When about two years old, the horse sheds the two middle teeth on the under jaw; at three years old he sheds two other teeth, one on each side of those he shed the year before; at four years he sheds the two remaining or corner teeth; at five years the two middle teeth are full, being no longer hollow, as the others are, and the teeth will have penetrated the gums; at six years old the four middle teeth are full, the corner ones only remaining hollow—the tusks are sharp, with the sides flinted; at seven years old the corner teeth are full, the tusks larger and thicker, and the horse is said to be of age."

The eighth year having passed, it is difficult to decide on the exact age of the horse. The incisors of the upper jaw are then the best guides. At nine years the mark is said to be worn away from the central teeth; at eleven, from the next pair; and at twelve, from the corner ones. The tusk likewise becomes shorter and blunter.

There are many circumstances, besides the scoundrelly filing, which some jockeys resort to, that render a decision as to the age of a horse very difficult. Horses always kept in a stable have the mark much sooner worn out than those that are at grass, and it is impossible to form any calculation at all as to cribs.

The following dental chart shows, as satisfactorily, perhaps, as can be shown on paper, the condition and marks of the teeth at the various ages:



APPEARANCE OF A NIPPER



A New Wrinkle About Horses.—Some close observer furnishes the following novel directions about estimating the age of a horse after he passes the age of nine: "After the horse is nine years old, a wrinkle comes on the eyelid, at the upper corner of the lower lid, and every year thereafter he has one well-defined wrinkle for each year of his age over nine. If, for instance, a horse has three wrinkles, he is twelve. Add the number of wrinkles to nine, and you will always get his age."

Feeding Horses.—*Grass.*—"Many think," observes the *Rural World*, "that horses that are kept in the stable all Summer should not be allowed to eat grass. They think it will

make the horse soft and wishy-washy, that it will throw him out of condition for hard work, and that he will not eat hay so well. This is particularly the case with some of the trainers of trotting or running horses. But these are all erroneous opinions and practices, and are giving way, gradually, to a more reasonable and natural system of feeding. Grass is the natural food of the horse. It is cooling and healthful food. It keeps the bowels open and sharpens the appetite. It promotes digestion and removes fever from the system. Therefore, by all means, let the horses nip grass fifteen or twenty minutes daily."

Carrots for Horses.—Experiments have shown that the best way to feed carrots to horses, is in conjunction with oats. Alone, carrots are not as good as oats alone, but in conjunction, they are better than either fed separately. If you are in the habit of feeding four quarts of oats to a mess, give two of oats and two of sliced carrots, and the result will be more satisfactory than if each were fed separately. Carrots become, under many circumstances a medicine, as well as an article of diet. Their influence on the stomach is most favorable, conducing to the most perfect digestion and assimilation.

In the report of the Maine State Board of Agriculture we find a statement of a crop of carrots of eight hundred and thirty bushels, or over twenty tons to the acre, grown at a cost of nine and three-tenth cents per bushel, or about seventy-five dollars per acre. In the same report we also find that, taking the cost of raising and the value for feeding, the produce of an acre of carrots is equal to the same realized on ten and five-seventh acres of oats. Mr. CURWEN, a distinguished English farmer, says an acre of carrots supplies a quantity of food for working horses equal to sixteen or twenty acres of oats. This, however, seems an extravagant estimate.

Cutting and Crushing Feed.—We learn from the *American Agriculturist*, that the London Omnibus Company use six thousand horses; and a recent report says, that three thousand of these fed daily on sixteen pounds of bruised oats, seven and a half pounds of cut hay, and two and a half pounds of cut straw, for each horse, did as much work in as good condition as the other three thousand which were fed on nineteen pounds of whole oats and thirteen pounds of uncut hay. Calling the two and a half pounds of straw equivalent to one and a half pounds of hay, and the saving is three pounds of oats, and four pounds of hay per

day for each horse. Thus, then, the mere bruising of oats, and cutting of hay, effects a yearly saving, for each horse, of thirty-four bushels of oats, and fourteen hundred and sixty pounds of hay. These experiments, made upon so large a number of horses, continued for a considerable length of time, are very conclusive, and forcibly indicate the advantage of what we have already urged—the grinding or crushing of all grain, and the cutting of all hay and other forage fed to horses. The same thing will be found partially true of other animals, though the ruminant—neat cattle and sheep—masticate their food more in chewing the cud, and hence the bruising or steeping of oats, corn, and other food is not so important for them as for horses and swine.

There is much American testimony confirming the above statement. E. W. HEERENDEEN, of Macedon, New York, who uses a number of horses in his extensive nursery, writes: "I have tried cutting feed, by using a cylinder raw-hide machine, cutting the straw about an inch long. I kept a team on the oat straw (which was a fair crop) which grew on less than three acres of land, from last of August to first of April, without using a pound of hay. It was mixed with about three quarts of corn meal and bran, in equal proportions, by weight, to each horse three times per day, feeding about a bushel of cut feed at night, and a little over half a bushel in the morning and noon. I am fully satisfied, from a careful record of the amount fed teams, that the expense of feeding a team of working horses on cut feed and corn meal and bran, mixed as before mentioned, is less than two-thirds of the expense of keeping them on dry hay and whole grain. Corn meal alone, especially for Summer use, is not as good for the health of horses as when mixed with bran, or better still, with ground oats. Horses subject to the heaves are either very much relieved, or entirely cured, while using the cut feed."

An Equine Aristocrat.—The following will be interesting to lovers of horse flesh, as well as many others, as giving a brief resume of "Dexter's" daily life: At six every morning "Dexter" has all the water he wants, and two quarts of oats. After eating, he is "walked" for half an hour or more, then cleaned off, and at nine has two more quarts of oats. If no drive is on the card for the afternoon, he is given a half to three-quarters of an hour's gentle exercise. At one o'clock he has oats again, as before limited to two quarts. From three to four

he is driven twelve to fifteen miles, after which he is cleaned off and rubbed thoroughly dry. He has a swallow of water on return from drive, but is allowed free access to his only feed of hay, of which he consumes from five to six pounds. If the drive has been a particularly sharp one, he is treated as soon as he gets in to a quart or two of oat-meal gruel; and when thoroughly cooled, has half a pail of water and three quarts of oats, with two quarts of bran, moistened with hot water. Before any specially hard day's work or trial of speed, his allowance of water is still more reduced.

Horse Stables should be high, spacious, well-lighted, and well-ventilated. The conduct of the monster CALIGULA, in feeding his horse from a golden manger, and declaring him a Consul of Rome, was really creditable, contrasted with the practice of leaving faithful horses confined in low, close, dark filthy dungeons, at a sacrifice of comfort, health, and value. Many of the diseases to which horses are subject are traceable to this inhuman treatment in denying air and light when both are so cheap. The details of constructing horse stables are too well-known to recapitulate.

Feeding Tube.—An arrangement for feeding hay to horses, now adopted in some of the best stables, is illustrated in the accompanying cut,



the sides of the manger not being shown. The hay is thrown down from above through a square board-tube, standing perpendicularly in one end of the manger. A semicircular opening, next to the manger, as shown in the figure, allows the horse to draw from the bottom all the hay he wants, without the inconvenience of having his eyes and mane filled with hay-seed, or of wasting hay, or of breathing on and rendering unpalatable the hay which he does eat, resulting from the use of racks. It may, also, save him from a fit of the heaves. These tubes may be about eighteen or twenty inches square, and should be as smooth as possible on the inside, the lower end being two or three inches larger than the upper, so that the hay

will drop or settle freely, and not become fastened or lodged in it. Openings, with doors opening outward, or with slides, may be placed at different heights, for convenience in throwing down hay, as the height of the mow varies.

A Cheap Feed Trough.—**SOLOMON ROBINSON**, does a good thing, when he records the following: "The farm of **JOSIAH MACEY**, a Westchester farmer of the old school, is conducted by his grandson, who has gained knowledge from books, and goes ahead with improvements—one of which is a new feed trough. It is simply an iron pot—just such a one as our dinner used to be boiled in before the age of cooking stoves. One of about four gallons is a good size, and it is set in a corner of the manger, in a casing of boards that enclose the rim, just up even with the top. It is superior to any wooden, iron, or stone feed-box we ever saw; is not expensive, and barring accidents, it will last forever."

Breaking Colts.—The process of breaking a colt should begin when it is two days old, instead of waiting, as many do, until it is two years old, and is wild and violent. When the foal first stands up and looks about intelligently, he should be handled, for during colthood he is more sagacious and tractable than other animals. Teach him to be fond of you, and give him good habits before he is old enough to make resistance, and he will never forget.

He should be handled daily, partially dressed, accustomed to the halter, and to whatever will be likely to attract his attention when put in harness. He should learn that man is his friend; rewards, not punishment should be the stimulus; and there is nothing for which a hired man should be more quickly discharged than for using any severity with growing animals. Even while the foal is nursing, he should learn to have his feet lifted and gently tapped with a hammer; to be led to and fro by the forelock or halter; to permit the pressure of the hand upon the back; to wear a surcingle and headstall; and he should receive caresses with bits of apple or slices of carrot when he has done what is required of him. The colt should never know that the whip exists. When a year old, or perhaps before, the bits may be occasionally put in his mouth, and he may learn his paces and be taught to obey the rein.

Never permit a colt to break away from you, or to resist successfully; and never require him to do too much. No colt should be worked be-

fore he is three years old, and four is still better, for the delay pays in the end—and always remember that his future usefulness is founded on implicit obedience resulting principally from attachment to and confidence in man. So shall the bugbear of “breaking” be abolished. A few theorists have an impression that “a colt that has been so much handled that at three years old he is ready to submit to saddle or harness without any breaking, is almost sure to make a dull, lazy horse;” but such an opinion is more the result of speculation than of experience, and is opposed to the instructions of all the best authorities on the horse. It is high time that the barbarous habit of harnessing wild horses to heavy wheels and reducing them to sullen obedience by sheer exhaustion, was wholly superseded.

Taming—The Rarey Method.—

Many horses, whose education has been neglected, or perverted by ignorant, or vicious keepers, grow up untamed and unmanageable. The art of subduing and instructing these has been practiced and taught with eminent success by JOHN S. RAREY, of Groveport, Ohio; and he has received the grateful acknowledgements of the civilized world for having brought his humane system to such perfection. All previous methods were based, more or less, on cruelty, and were never entirely successful.

Mr. RAREY received in England \$120,000 for his lessons and exhibitions. He tamed a zebra, an animal hitherto regarded as untamable, so that he could ride it as he pleased. He tamed the savage stallion Cruiser, so vicious that the life of his keeper was always in danger, and he had to be fed through a barred helmet.

Mr. RAREY started on the following principles: In teaching a horse obedience we must overcome, 1, *his fear of man*; 2, *his anger*, which makes him as resentful as is man himself; 3, *his impatience of restraint*. And we must substitute for these, 1, *affection for his master*; 2, *a fear of chastisement* and a conviction that obedience is the only way to escape it. The means which he adopted were:

First. Familiarity of the horse with man's presence, under circumstances that convince him of man's kind intentions.

Second. A demonstration that resistance is useless, that man is superior and can overcome him physically.

During the struggle the man must never show signs of fear, for the instinct of the horse will

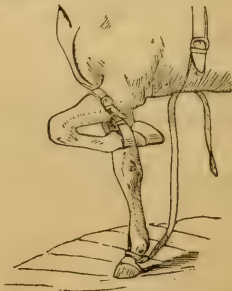
be quick to detect it; nor must the horse be allowed even a temporary advantage, for entire success depends on his feeling the hopelessness of the combat.

The RAREY method consists in subduing the animal by depriving him of the use of his limbs, and making him entirely powerless in the presence of the operator; and then in exciting his gratitude by releasing him from the situation.

The first step, to halter the animal, is sometimes the most difficult part. RAREY's pupils sometimes rubbed a little of the oil of cummin on their hands, when the horse will permit himself to be approached without resisting. The enclosure where the struggle takes place should be on soft earth which is free from stones.

RAREY never used a whip or any implement of coercion, or any violence; relying wholly on coaxing, to get the bridle on. He made it a rule never to frighten a horse, or chase him, or halloo at him, or speak except in a quiet tone. For biting horses he had a wooden gag bit, made large enough to prevent the horse from shutting his teeth.

When the strong bridle is on, the preparations are quietly made to throw the horse upon his side. This is done easily and harmlessly by the aid of a stout surcingle and two stout straps. The first of these has a buckle on one end, and is to be slipped over the bent left fore leg, and drawn snugly about the fore-arm and fetlock. The second is looped over the right foot, below the fetlock, and the other end passed under the surcingle, as represented in the engraving:



THE USE OF THE RAREY STRAPS.

The adjustment of these may take some time and will not be boys' play, if the animal is

violent; but only rubbing, handling, and quiet talking, and other soothing means are to be used. If he inclines to rear and plunge, give him the bridle; he will soon learn that he is securely fastened.

As soon as he becomes quiet, he is urged to move a little, when the strap is drawn suddenly through the surcingle, and the right leg is lifted and fastened firmly in the same position as the other. The horse comes down on his knees, when the operator takes another turn or two of the strap, fastening it to the surcingle. Now the struggle commences in earnest. If the horse be spirited, he will rear and plunge about the enclosure, requiring a good deal of skill, agility, and self-possession in the operator, who merely keeps by his side to guide him until he tires out and is willing to lie down of his own accord.

If he try to jump up and resist a second time, the process is to be repeated, until the subjugation is complete. It requires more judgment than strength in the operator, as boys, and even ladies, have successfully laid down and conquered large horses. The struggle rarely continues more than ten minutes—fifteen being the longest on record.

When he is completely subdued, and on his side helpless, follow up the advantage, by caressing and soothing him. Rub his neck, back, and legs; speak kindly to him; bring any articles that he may be inclined to fear and place upon him, such as the harness, buffalo robe, saddle, umbrella, etc. Sit upon him, all the while fondling and caressing him. Remove the straps, and handle his legs again, still compelling him to remain down. If he springs up before you wish, replace the straps and repeat the operation. Two or three lessons a day for a week, succeeded by rewards of a bit of sweet apple or any favorite food, for obedience, will reduce almost any horse to submission. Do not forget that the law of kindness is more potent than the law of violence.

How to Keep Horses Quiet while being Shod.—The new French method of rendering a horse quiet while being shod is both simple and effective. The head of the animal being covered, so that he can not perceive what is going on around him, and an assistant having hold of the bridle, another person stands in front and orders the horse to lift his left hind foot. In reply the horse probably begins to kick violently. A smart blow is then administered by the person who has spoken, on

his cheeks with each hand—the hands, instead of being removed after the blows, being strongly pressed on the cheeks. A new order is given to lift the foot, and is again disobeyed, but less energetically than at first. The blows on the cheeks are repeated for the second time. At the third repetition the animal trembles all over; and resistance being at an end, he is shod as easily as the quietest horse.

An officer in the United States Army recently subdued, in the following manner, a horse that was troublesome to those handling his feet to be shod: He took a cord about the size of a common bed cord, put it in the mouth of the horse like a bit, and tied it tightly on the top of the animal's head, passing his left ear under the string, not painfully tight, but tight enough to keep the ear down and the cord in its place. This done, he patted the horse gently on the side of his head, and commanded him to follow; and instantly the horse obeyed, perfectly subdued, and as gentle and obedient as a well-trained dog; suffering his feet to be lifted with entire impunity, and acting in all respects like an old stager. That simple string thus tied made him at once as docile and obedient as any one could desire. The gentleman who furnished this simple means of subduing a very dangerous propensity intimated that it is practiced in Mexico and South America, in the management of wild horses.

Taming Wild Horses.—The last-mentioned process is akin to the method of taming the lassoed horses of the South American pampas, as described by an eye-witness: "A post is firmly fixed in the ground to which a ring is attached. The horse is then brought to the post with a long halter, and made fast. The breaker takes his poncho—a large cloak worn by the South Americans—and ties it round the eyes of the horse so as to blindfold him. The animal is then left to himself, and shortly begins to tremble with fear at his unwonted, helpless condition. A profuse perspiration breaks out upon him, and, if suffered to continue thus, he falls from the exhaustion of the nervous system caused by his fright. Before this takes place, a rude saddle is placed on his back, heavily weighted at the stirrups, and to this he quietly submits. Presently, when the animal is stupefied, the breaker goes up to him, and, patting his neck and otherwise caressing him, in some respects soothes him. This goes on till the horse exhibits signs of reliance on the man. By and by, the poncho is removed

and the lesson wished to be imparted has been learned, namely, that of looking upon the one who has relieved him from the fearful poncho as his friend. We have seen this lesson so skilfully administered that the breaker has removed the weighted stirrups, and immediately mounted on the bare back of the horse, which behaved with perfect docility."

Never Use Blinkers.—It is unnatural and cruel to blind a horse's sparkling eyes with "blinkers." They are obstructive; they make a horse nervous; and they impair his beauty. Mr. RAREY says, in the *London Times*: "All my experience with and observation of horses, proves clearly to me that blinkers should not be used, and that the sight of the horse, for many reasons, should not be interfered with in any way. Horses are only fearful of objects which they do not understand or are not familiar with, and the eye is one of the principal mediums by which this understanding and this familiarity are brought about. I have not, in the last eight or ten years, constantly handling horses both wild and nervous, ever put blinkers on any of them, and in no case have I ever had one that was afraid of the carriage he drew behind him, or of those he passed in the streets. Horses can be broken in less time and better without blinkers; but horses that have always worn them will notice the sudden change, and must be treated carefully the first drive. After that they will drive better without the blinkers than with."

Brief Suggestions on Management, etc.

—The conceited attempt to revise one of the noblest works of the Creator by docking a horse's tail, has nearly passed away, and is now practiced only by the vulgarist jockeys.

The check-rein is rapidly following ear and tail mutilation and the blinder into oblivion.

A whimsical old rhyme, which will not do to "tie to," says of the horse:

One white foot, buy him;
Two white feet, try him;
Three white feet, deny him;
Four white feet, and one white nose,
Strip off his hide and give him to the crows.

The following is supposed to have been the petition of a sensible horse to his driver: Up the hill, whip me not; down the hill, hurry me not; on level road, spare me not; loose in stable, forget me not; of hay and oats, rob me not; of clean water, stint me not; with sponge and brush, neglect me not; of soft, dry bed, deprive me not; tired and hot, wash me not; if

sick or cool, chill me not; with bit and reins, oh! jerk me not; and when you are angry, strike me not.

"A black horse can not stand heat, nor a white one cold. If you want a gentle horse, get one with more or less white about the head, the more the better."

Anything a horse can touch with his nose without being harmed, he does not fear. Therefore, the hand, the halter, girth, blanket, saddle, harness, umbrella, buffalo robe, or whatever is brought in proximity to him should be introduced to and touched by that delicate organ.

Always feel kindly toward a horse, no matter what he does to you, and consequently never show "temper." Remember the horse knows instinctively how you feel.

When you mount a horse, teach him that the whip and spur are not to be used except in cases of emergency. Never mount or dismount without passing your hand gently over the face of the animal; and, by the way, ladies, the softer the hand that does that the better.

There is not one farm horse in a hundred that is more than half groomed.

See that the plowboy washes the breasts of the horses with cold water every night after work, and it is not a bad plan to slip off the collar at noon, and clean it, and, at the same time, wash the breast of the horse, remembering to rub it dry before putting on the collar again.

Never expect to have a good horse if you cram your colt; it can not be done. The old adage in Vermont, "A ragged colt makes the best horse," means everything. Let it have milk and soft food, but avoid the feeding of grain until it is three years old, as you would avoid feeding brandy and water to your children when they are little.

Do not let horses stand long in the stable at any time of the year without exercising.

When a horse has fallen from the slippery state of the ground, the readiest method of enabling him to rise is, to place a piece of old rug or carpet under his fore feet, and he will be able to get up at once.

Whatever the color of the horse, the mane and tail should be darker than the hair of the body. Beware of that horse with dark hair and light mane and tail.

Horses were designed as beasts of burden to relieve mankind of fatiguing drudgery. It does not hurt them to work hard, if they are treated kindly. It does not injure a fast horse to go fast, more than it injures a slow horse to

go slow. Hard service does not kill horses or men. It is fretting, worrying, and abuse that do that.

A kicking horse will sometimes be cured by fastening a short chain to the hind legs in such a way as to inflict punishment every time it kicks. But if you have a horse that kicks or bites persistently, you had better sell him or kill him.

To Start a Balky Horse, tie a rope to his tail, pass it between his legs, and pull on it from the front; or tie his ears together, and he will forget his obstinacy; or, try the following, more simple than either, from the *Ohio Farmer*: "Fill his mouth with dirt or gravel from the road, and he'll go. Now the philosophy of the thing is, it gives him something else to think about. We have seen it tried hundreds of times, and it has never failed."

A Maine man gives his method of treating balky horses, as follows: "Let me inform humane men and hostlers, and all who hold the rein, that the way to cure balky horses is to take them from the carriage, and whirl them rapidly round, till they are giddy. It requires two men to accomplish this, one at the horse's tail. Don't let him step out. Hold him to the smallest possible circle. One dose will often cure him; two doses are final with the worst horse that ever refused to stir."

Diseases of the Horse.—We have no room for an exhaustive treatise on the numerous diseases of the horse, but shall refer to some of the commonest ailments and infirmities. Those needing more specific information, are referred to STEWART'S *American Horse Book*, published by C. F. VENT & Co., of Cincinnati, which gives the Allopathic treatment; and to HERBERT'S *Hints to Horse-Keepers*, which gives the Homeopathic prescriptions. As a rule, any medicine, except an emetic, is good for a horse, that is good for the same complaint in the human system. But, an ordinary dose for a man should be multiplied nine or ten times for a common horse. Compared with man, the horse breathes only half as fast, and his pulse beats, and his blood flows but half as fast. His diseases develop and abate more slowly. For some of these, we give several remedies, having selected those sanctioned by good authority:—

Bots.—HERBERT says: "Bots are the larvæ of the gadfly. The eggs are deposited on the horse's hair, and after he licks them off and swallows them, they are hatched in the stomach,

where they adhere." This is the prevalent opinion; it is generally believed, also, that the bot frequently eats through the walls of the stomach, until it kills the horse. MAYHEW'S English book says, that the cause is "turning out to grass," and there is no remedy but the action of nature. STEWART, and also the editor of *The Field, Turf, and Farm*, holds that the stomach of the horse is the natural residence of the insects; that the colt's stomach is full of them at birth; that they are not related to the offspring of the gadfly, which the horse sometimes swallows; that they hang by the tail to the coat of the stomach, and feed only on the chyme from the food; and that there is no evidence that they ever injure the horse's health. STEWART claims that, though the stomach of a dead horse is sometimes found "completely riddled by the bots," this is only evidence that they are trying to escape from a place no longer suited to their wants. This may be so, but the fact is, that horses *do* die in terrible distress, and that an immediate examination discloses swarms of bots, with their hooked beaks fastened in the coat of the stomach, great patches of which are already eaten away; and it seems to us that the presence of unusual numbers of ravenous bots in the vicinity of the corrosions, raises a violent presumption against them. It is difficult to believe that swarms of such devourers can inhabit the very vitals of a horse, without causing pain and disease. So we pronounce them guilty, and sentence them to either one of the following penalties:

Pour down the horse a quarter of a pound of alum dissolved in a pint of water (milk warm); in five or ten minutes after pour down him a pint of linseed oil or other mild active purgative; in ten minutes the horse will rise and eat.

A junk bottle full of strong sage tea, made very sweet with molasses. Two or three doses is generally sufficient for a cure.

Or feed the afflicted animal with ashes and tobacco once a week.

Bruises, Sores, Sprains, etc.—Shower with cold water two or three times a day, and when dry, wash with Roman wormwood tea, salt and water, or beef brine. Never wrap up sores or sprains.

A good wash: Take one-quarter of a pound of saltpeter, half a pint of turpentine, and put them into a bottle; shake up well before using; apply to the wound three times a day with a feather.

Ointment.—Take a peck of the inside bark of white oak, and two pails of water; boil until

the strength is extracted; then remove the bark, add half a pound of fresh butter, and simmer to the consistency of molasses, being careful not to burn it.

Catarrh—running at the nose—a remedy proposed by MAYHEW is *steaming*, by the following process: Take a bag which will readily allow water to drain through it. Fix a bail strap at the mouth, like a feeding bag; put in the bottom a gallon of yellow or pitch-pine sawdust, or if that is not convenient, any other sawdust, with an ounce of spirits turpentine mixed with it; thrust the horse's nose well into the bag and slip the strap over the ears to hold it there; then pour hot water from a tea-kettle through a hole in the bag some distance below the nose, on to the sawdust, and let him inhale the steam. Repeating the operation a few times will remove the difficulty. Powdered charcoal, say half a tea-cup at a time, will have a good effect—let it be mixed with a pint of water.

HERBERT, homeopathic, prescribes in the first stages, six drops or globules of aconite every three hours; in more advanced stages, six drops of arsenicum twice a day.

Colic and Inflammation.—This is generally produced by hard water, or too much green food. There are two kinds of colic, flatulent and spasmodic—the latter caused by a contraction of the small intestines; the former by indigestion, and the inflation of the bowels by fermentation and the resulting gas. Quiet is indispensable. Never resort to running the poor animal. It is an absurd and cruel method. A dose consisting of a tea-cupful of fresh pulverized charcoal, in a quart of cold water is generally a relief for indigestion. A drink of chloride of lime dissolved in water is also relied on for relief. In flatulent colic, great benefit is usually obtained from frequent injections, until the *feces* effect a passage. This may be of salt and water, or of strong soap-suds. If it does not effect a cure, the only infallible remedy is to introduce the greased hand and arm into the rectum and carefully remove the obstructive balls, one by one.

Mr. R. HOWELL, of Shiloh, New Jersey, gives the following "infallible remedy" for colic: "Take a piece of carpet, blanket, or any thick material, large enough to cover the horse from his fore to his hind legs, and from his spine to the floor as he lies; wring it out of hot water, as hot as you can possibly handle it. You need not fear scalding the animal. Apply this to the animal and cover it with a similar

dry cloth. As soon as the heat diminishes much, dip the wet cloth again in hot water. This plan will within an hour cure the worst case of colic."

The *Ohio Valley Farmer*, recommends the following: "As soon as it is ascertained that the sick horse has the colic, give him a dose of pure pine tar, by pulling out his tongue and spreading it over with the tar. As soon as the animal begins to swallow the tar he will get relief."

The homeopathic remedy is six drops of aconite and arsenicum alternately, every forty minutes, till relief.

Distemper.—The dangerous disease which is common in America as "horse distemper," is the same as the English "strangles," and is a bronchial difficulty, involving acute inflammation of the salivary glands and a painful abscess under the hinge of the jaw. MAYHEW likens it to the measles, in that both are generally suffered in youth, both are eruptive and both are cast out at some expense to the system. Distemper is sometimes attended with temporary blindness. It is very contagious, and never attacks a horse a second time.

Ordinarily, the treatment of distemper is an affair of great simplicity. The nature of the constitutional disorder by which the local abscess is accompanied, is but little known, further than that it is best met by feeding the animal liberally on soft food—scalded oats, malt mash, linseed, or hay tea, etc., and putting him in a free-ventilated stall, and clothing him well. Bleeding and purgation must be avoided—there is a debility about the animal that strongly interdicts both. To promote suppuration, fomentation and poultices may be advantageously employed; should the tumor manifest a sluggish disposition, wet the poultice three or four times daily with a mixture of equal parts alcohol and hot water. Do not be in a hurry to open it. The abscess will generally point and break *spontaneously*. This constitutes all that is required. Distemper is a specific fever, and, unless complications arise, is best left to run its natural course. Diuretics or any other medicines promoting absorption, or medicines to elicit discharge from the nose, are inadmissible, and calculated to be seriously injurious to animals having distemper.

It is deemed, by some, advisable to wash the swelling with a strong decoction of tobacco every day.

Flies.—To prevent the affliction of cattle and horses by flies in Summer time, "take two or

three small handfuls of walnut leaves, upon which pour two or three quarts of cold water; let it infuse one night, and pour the whole next morning into a kettle and boil for a quarter of an hour; when cold it is fit for use. Moisten a sponge with it, and before the horse goes out of the stable, let those parts which are most irritable be smeared over with the liquor."

The annoyance by flies is also said to be much mitigated by bathing with a mixture, one-third kerosene and two-thirds lard oil.

Dr. DODD mentions that "those oxen that have taken sulphur for a long period of time, are not infested by gadflies."

Fistula.—This terrible affliction makes its appearance on the withers over the shoulder-blade, and is the result of neglected saddle galls, or a bruise from a blow, or a bite. In the practice of a few years ago, arsenic was the specific mostly relied on. A gash was cut in the top of the tumor and the poison introduced. It was taken up by the blood, and generally resulted in a disgusting running sore, often ending by eating all the flesh from the backbone, and rendering the animal worthless. A more rational treatment is now practiced. Dr. ROBERT STEWART, veterinary surgeon, has had long experience in treating fistula, and the following is his prescription: At first apply corrosive liniment,* with a swab, every morning. If in ten days the swelling has not abated, a thin coating of the May liniment† should be spread over the tumor each morning, and be carefully washed off with soap-suds, and followed by grease at night. When the pus begins to ooze out freely, the liniment may be gradually increased in quantity. It must not be allowed to remain on too long. Alternate sometimes with the corrosive liniment. Bleed once or twice. Feed sulphur with green food.

Some recommend potash, applied to the running sore. A correspondent of the *Germantown Telegraph* says: "No matter how long the sore has been running, it can be cured in a brief time, and at a cost not exceeding ten cents. First wash with cold water thoroughly, then drop eight or ten drops of muriatic acid in

twice a day till it has the appearance of a fresh wound; then wash clean with soap-suds made of castile soap, and leave it to heal, which it will speedily do if the acid has been used long enough." Fistula of the withers is easiest eradicated when the swelling is opened upon its first appearance.

Quicklime is sometimes sprinkled in the wound made by the operator's knife, being occasionally washed out with castile soap. The following hydropathic method is better than all others, if it shall prove to be uniformly so effectual as in this instance: Mr. S. D. INGHAM, Ripley, Ohio, after tormenting his horse to madness with the various prescriptions of horse doctors for the cure of fistula, resorted to cold water, which was poured from a watering pot upon the sore, and a complete cure was effected in five weeks from two daily applications.

Founder.—This is inflammation of the feet. It is generally caused by overdriving, and then allowing the horse to stand in a cold place, or drink enough cold water to get a chill. A correspondent of the *Rural World* gives the receipt: "One table-spoonful of pulverized alum thrown well back in the horse's mouth just as soon as you find out he is foundered. Keep from water during the day. In every case that I have tried, it has proved a sure cure."

MAYHEW advises the removal of a quart of blood from the neck vein in the earliest stage, and the substitution of a pint of water by injection into the orifice. "In a few minutes copious purgation and perspiration will ensue, and the fever will be greatly abated." Clothe the horse warmly, and feed on thin gruel.

STEWART recommends drenching with hot salt-and-water, and bathing the legs freely with it; afterward applying the corrosive liniment.

We give the following without being able to vouch for it: "Immediately on discovering that your horse is foundered, mix about a pint of the whole sunflower-seed in his feed, and it will give a perfect cure. The seed should be given as soon as it is discovered that the horse is foundered."

The following advice comes from high authority: Split open with a sharp knife the little point in the long hair at the back of the fetlock! It is said to afford almost instantaneous relief.

Homeopathic remedy: Aconite, beyonia, and arsenicum, taken alternately, six drops every two hours.

Glanders.—This is a disease of the glands of

*The following are STEWART's directions for making the corrosive liniment, which he recommends for big head and jaw, grease, thrush, scratches, swelled legs, hoof-rot, foot-evil, corns, ulceration of foot, fistula, poll-evil, founder, ring-bone, and spavin, in their early stages: Put a pint of turpentine in a good strong bottle; grind one ounce of corrosive sublimate in a druggist's mortar until it is powdered as finely as possible; mix it with an ounce of gum camphor, and add to the turpentine; shake the mixture, and let it stand twenty-four hours. It is a violent poison, and care must be taken in its use.

†The May liniment referred to is simply a strong decoction of May-apple roots, with an addition of one-fourth part lard.

the eyes and nose, and is accompanied by glanderous discharges which ulcerate the lining membranes. It is a terrible malady, more contagious than any other, and in its last stage incurable. Glanders may be produced by overwork, neglect, filth, want of ventilation, fever, bronchitis, a violent catarrh, anything that impairs the bones or membranes of the nose. There are three stages, only in the first, or perhaps second, of which does it admit of a cure. The earliest symptom is an increased discharge of aqueous mucus from the nostril—almost always the *left* nostril; the second stage shows the discharge of sticky, gluey matter, and a swelling of the glands; the third stage shows a large discharge of pus, the membrane will take a dark color and spots of ulceration appear.

Dr. STEWART announces a specific for the cure of glanders in the first and second stages, that rarely fails when properly used, *viz.*: *tobacco*. First, take three quarts of blood from the neck vein; then make a strong decoction of tobacco, and put a pint in a gill of warm water and pour this mixture down the horse. It will make him very sick, but is not dangerous. Swab out the nostril thoroughly with some of the decoction. Make a dose of four ounces of sulphur and two of resin, both pulverized, and get him to eat as much as possible each day. Use the swab for eight or ten days, and drench with the tobacco mixture every third day. Fumigate the stables, and take care of the other animals, and beware of catching it yourself. This prescription is, perhaps, the best known remedy. In England the disease is regarded as incurable, and it is lawful for any man to kill a glandered horse in Smithfield market.

Heaves (Bellows; Broken Wind).—Results from a rupture of the air-cells of the lungs, causing laborious breathing. It can never be entirely cured; but its painful manifestations can be suspended by feeding roots and grain instead of hay. Jockeys have a way of concealing its presence by feeding on wet oats, with a weak solution of lime in the water he drinks. The horse should not be fed or watered for an hour before going to work. By this course, the breathing may be relieved, and kept in disguise, but it will break out again on returning to a diet of dry feed.

Another recommends: "Put a desert-spoonful of ground ginger into the food every day." Another: "Mix equal parts pulverized borax and saltpeter, and give the diseased horse a table-spoonful twice a day; and every other

day, a spoonful of sulphur. Give also half a spoonful of copperas twice a week. Another: "Take one pint of fresh lard and a quart of fresh beef blood. Give it to him once a day for three days." The first remedy is, probably, as good as any.

Nail in the Foot.—Bruise peach leaves and apply to the wound, and the cure is magical. Both men and horses have frequently been relieved in this way, when they were on the point of having the lock-jaw.

Poll-Evil (Bighead).—This is a fistula of the head, resulting in an abscess, generally caused by some bruise while the animal's vitality is weak. It should be treated with the liniments, precisely like the fistula of the withers. MAYHEW says, however, that, unlike fistula, poll-evil "must come to maturity before it can be treated with any hope of success."

This affliction has been successfully relieved as follows: "I tried powerful remedies," says a farmer in Kentucky, "but could make no permanent impression on the tumor, which kept enlarging. I took a quantity of masterwort or angelica root and pulverized it so as to form a layer two or three inches thick on the back part of the head, and saturated it with a solution of sugar of lead and litharge, say a drachm of each to a pint of good vinegar, and then bound it on. Night and morning made a fresh application. In two or three days took off the old and put on a fresh quantity. After making two or three applications, not thinking it was going to effect a cure, I left the poultice on for some days; when, upon removing it, I found a very decided impression had been made upon the tumor, and that the swelling had subsided considerably. This induced me to renew the applications for a number of days. And for the past three months, it appears to me that my horse is as well as when I first obtained him." A few shower-baths of cold water on the sore have been known to cure.

Ring-Bone.—This is an enlargement and distortion of the bones of the pastern, near the foot, resulting from a disease of the synovial oils. The superinducing cause is almost always overexertion. It admits of cure only in its early stages; permanent club-foot being ring-bone in its worst form. Some good liniment, rubbed in with active and severe friction, is the best remedy.

MAYHEW recommends an ointment of an ounce of iodide of lead mixed with eight ounces of lard; applied after the pain has been allayed with poultices of camphor and

powdered opium, equal parts. Mercurial salve is also said to possess considerable merit as a remedy—rubbed and dried in.

F. F. COGSWELL gives the following ointment, which is considerably used: "Spanish flies, one ounce; camphor gum, one ounce; sal ammoniac, four drachms; spirits turpentine, half pint. Apply it four mornings; dry in with hot iron. Keep the horse from biting it after the application. Does not take the hair off."

Scratches.—A thick, dry, scabby covering of the skin, coming in little patches on the heel, and spreading until they become one solid mass, accompanied by great itching. Keep the feet clean and oil occasionally and the scratches will never approach.

To cure, use of sweet oil six ounces; borax, two ounces; sugar of lead, two ounces; mix thoroughly, and apply twice a day, having washed the feet with castile soap half an hour previously.

The veterinary editor of *Wilkes' Spirit of the Times* recommends the following: "Take sulphate of zinc, one drachm; glycerine, two ounces; apply every morning." Another remedy is: "Wash the legs with warm strong soap-suds, and then with beef-brine. Two applications will cure the worst case."

Spavin.—Bone spavin is an osseous enlargement, which appears on the inside of the hock, just below the joint, and is generally caused by a bruise or a sprain. STEWART prescribes corrosive liniment for this, as for most of the diseases of the feet and legs.

Some of the best farriers change the liniment to a paste, compounded as follows: Corrosive sublimate, quicksilver, and iodine, each one ounce, mixed with lard to proper consistency. These should be rubbed together, the iodine and quicksilver being united first. Shave the hair off the spavin, then grease all around it, to prevent the application spreading; rub into the spavin as much of the paste as will lie upon a nickel cent, for three to five days, according to the character of the enlargement. After the spavin comes out, wash the hock thoroughly in soap-suds, and heal with some mild salve. This recipe has been sold for three hundred dollars, and the buyer was satisfied with its effectiveness.

The following is given as a sure cure for blood spavin: "Common poke-root cut into slices and boiled in urine till it becomes quite strong. Bathe the parts two or three times a day until a cure is effected. It should not be used too strong, or it will take the skin off."

Staggers.—Staggers is a term applied vaguely to half a dozen ailments of animals. In the Northern States of this Republic and in Europe there are varieties of vertigo and apoplexy, known as "staggers," descriptive of the giddiness which characterizes them. "Grass staggers" is an acute indigestion, occasioned by overloading the bowels with tough grass or too much grain. This is remedied by a few doses of a purgative medicine, such as six drachms of aloes and a drachm of calomel, rubbed down together and given in a quart of thin, boiled gruel.

But there is in our Southern States a variety of mad or blind staggers, more malignant and often fatal, than that existing in any other locality. It is accompanied with fits and spasms, violent paroxysms and terrible sufferings, and about 1850 it made fearful ravages through the Southwestern States.

STEWART devoted himself to a study of the disease, and found that horses seemed most exposed to its attacks when fed upon green corn grown upon new land; that such corn was very liable to be badly eaten by a species of greenish-yellow worm, that left behind it a poisonous dust; and, finally, that the malady was caused by snuffing up this dust, where it can poison the glands, eyes, and brain. Assuming that this theory is correct, the means of prevention are obvious.

STEWART's remedy, for use in the earlier stages, is as follows: 1, Bleed the horse in the neck vein as long as he can bear it; 2, give as a dose of physic, a half pound of Epsom salts in a pint of warm water, and add a gill of tobacco juice; 3, give two ounces of laudanum in a little warm water; 4, get a small stick, two feet long, with a swab on the end of it, and swab out the nostrils with warm weak tobacco juice; 5, wet the skin on top of the head with corrosive liniment or turpentine, lay on a thick old cloth, and apply a hot smoothing-iron till a blister is drawn.

Homeopathic remedy: Four drops of aconite every hour until relieved; then one or two drops an hour until cured.

Swinney.—A correspondent treats it as follows:—"I simmer together equal parts of hog's lard and spirits of turpentine, and, as hot as practicable, apply it to the shoulder, and bathe in thoroughly with a chafing iron. This should be applied every other morning for six days (be careful and not burn the horse, for this would cause inflammation), then apply some healing liniment until the horse is well."

Warts.—A Nebraska man tells the *Rural New Yorker* how to cure warts on horses: "Mix equal quantities of spirits of turpentine and sulphuric acid, stirring slowly in a tumbler, and afterward bottle the ingredients. Rub grease around the base of the wart, and then apply the medicine to the wart with a feather once or twice a day it will gradually eat it off."

Mules.—The nation is indebted to GEORGE WASHINGTON for introducing mules into this country, improving their qualities and popularizing their use, especially in the Southern States. When he retired to private life at Mount Vernon, the King of Spain presented him with an admirable jack and two jennies; and LAFAYETTE reinforced his stock still further. WASHINGTON crossed his blooded mares with these jacks, and the result was a superior race of mules.

The mule is a hybrid produce of an ass with a mare, having a large, clumsy head, long erect ears, a short mane, and a thin tail. The hinny is the hybrid produce between the she ass and a stallion; the head is long and thin, the ears are like those of a horse, the mane is short, and the tail is well filled with hair. The hinny is much less common than the mule, because, being less hardy and useful, he is never cultivated.

Longevity.—"Who ever heard anybody say 'dead mule?'" asks the droll JOSH BILLINGS. The longevity of this animal is remarkable. Some are recorded as having seen a hundred and fifty years; and many live to be sixty to eighty. ROBINSON thinks that "with proper usage, they would commonly attain to about forty years, and be serviceable to the last."

Other Qualities.—The *Farm Journal* remarked, in the day of low prices: "Another argument in favor of mules is, the comparative ease with which they can be reared. With such a soil and climate as Pennsylvania the cost of raising a mule need not exceed that of a three-year-old steer. The mule at that age, even though an ordinary one, will command one hundred dollars, and if a first-rate one, from one hundred and twenty to one hundred and fifty dollars; while nine-tenths of our horses at three years old, are not worth more than eighty dollars, although the cost of feeding and attention is nearly twice as great."

The same journal insists that mules, humanely treated, are as obedient and good-natured as horses. The *Cincinnati Commercial* says they are equally tractable, cost less by

thirty or forty per cent.; they consume forty per cent. less food, are thirty-three per cent. more durable and move with a steady unyielding celerity that recommends them to all who have tested their merits.

Mules are breachy; their curiosity and enterprise lead them over fences deemed insurmountable; so that the owner may be by no means certain in what pasture or field he will find them in the morning. This is a freak which will not be generally admired; so that it seems most expedient to keep mules usually in harness or stable. But even with this drawback, nearly every farmer of a hundred acres, in our warmer latitudes, can afford to keep one pair of mules.

SHEEP GROWING.—THE WOOL SUPPLY.

The Demand for Wool.—The census shows that a capital of \$58,000,000 is invested in the woolen manufactories of the United States; that this employs 30,142 hands; that nearly 17,000,000 pounds of wool are annually consumed, and that the value of the entire product is \$43,200,000. The supply of wool in the United States has been so much smaller than the demand for the last few years, that the importation of the article, which in 1845 was 3,500,000 pounds, valued at \$250,000, in 1850 was 18,600,000 pounds, valued at \$1,681,000, and in 1863, 65,000,000 pounds, valued at \$11,000,000. Instead of importing wool, we ought to supply Europe, for sheep can be grown more profitably here than in any other country. It is estimated that, under ordinary culture, the profits of raising sheep for wool are about eighteen per cent. on the capital; while the profit on the mutton should be at least twenty per cent. more.

Profitableness of Sheep Husbandry.—The editor of the *Wool Grower* says that sheep will, with proper care, pay more for the capital invested than any other animal, or any other system of farming. "Were it for the first time now presented to us, we should consider the sheep one of the most wonderful animals nature has produced for the use of man. There is no animal in which there is so little waste, or so little loss. For at least seven years of its life it will give an annual fleece to the value of the carcass, and the yearly increase will be nearly or quite equal

to the cost of keeping, giving, as a general thing, a profit of cent per cent.

"We assert that there is hardly a locality in the whole Union, where any kind of farm animal can subsist, that sheep, if properly attended to, will not give a net profit on the investment of at least fifty per cent. The inducements to grow more wool are—a sure market, less fluctuating from the point of profitable productions than any farm product, and a larger interest of profit on the capital invested than any other business."

Mutton for Farmers.—"The cheapest meat for farmers," says the *St. Louis Rural World*, most truly, "is mutton. It may safely be said to cost nothing. The wool that is annually shorn from the body of every sheep richly pays for its keeping. In this climate, it costs less to keep sheep than at the North, on account of the shortness of our Winters. Then there is the increase—an item of great importance. The increase is so much clear profit. From this increase the farmer can get all his meat for the year. Or, he may save some of the lambs, and use some of the older sheep in their places. The pelt of the sheep, if killed for mutton, is also saved and sold, which is worth nearly as much as the sheep would sell for.

"It is also the most convenient meat to have on hand. In the warmest weather a farmer can take care of one sheep after being killed, without letting it spoil. With beef this is not so easy. One hand can kill and dress a sheep in an hour.

"We have said nothing about its being the healthiest food. This is admitted. It is true that pork is the chief meat of farmers; but it is the unhealthiest of all, whether fresh or saturated with salt to preserve it sound.

"Let every farmer keep sheep. They are the most profitable stock on a farm. The hog's back only yields bristles, while the sheep's yield downy wool. All that you feed to the hog is gone, unless you kill it; while the sheep will pay you for its keeping with its fleece yearly. The hog is a filthy, voracious animal—the sheep, gentle as a dove, and neat and cleanly."

Cost of Keeping.—Sheep men reckon that to keep ten sheep costs the same as to keep a cow. It is certain they will eat many things that a cow or another animal will not eat. They leave few plants; they gather up every-

thing to advantage. Briars can not grow where sheep run, neither can the land sprout. From reported experiments, made by LINNEUS, with four hundred and eighty-five plants, he found that horned cattle would eat only two hundred and seventy-six, horses two hundred and sixty-two, swine seventy-two; but goats would eat four hundred and forty-nine, and sheep three hundred and eighty-seven. We do not understand that sheep do a young orchard much good. Ten sheep should be so well kept that they will produce fifty pounds of wool.

Different Breeds.—We shall refer briefly to some of the characteristics of the different breeds cultivated in America.

Natives.—These are mainly of English origin, the first sheep having been brought to Virginia in 1609, and to New York and Massachusetts about 1625. They were long-legged, narrow-breasted, coarse-wooled, light-quartered animals; a fair average weight being about twelve pounds a quarter. The original natives have become so mixed with later importations that they are nearly extinct. American farmers are waking up to their own interests, and getting sheep of improved breeds. The old-fashioned long and coarse-wooled kinds ought to give place to such sorts as the South Down, Cotswold, or Merino.

English Sheep.—Lincolns, Cotswolds, Leicesters (or Bakewells), Dorsets, Oxfordshire Downs, Shropshire Downs, Hampshire Downs, and South Downs, constitute the main breeds of English sheep. Each variety decreases in size and weight of wool, commencing with the Lincoln, down to the Forest sheep. Extra fed ones have run as high as follows, dressed meat and washed wool: Lincolns, carcass, 350 pounds, fleece 28 pounds; Cotswolds, 320 and 26; Leicesters, 250 and 22; Dorsets, 240 and 20; Oxford Downs, 240 and 18; Shropshire Downs, 220 and 16; Hampshire Downs, 200 and 12; South Downs, 160 and 10. Forest sheep average about 70 and 3.

The Leicester.—The New Leicester is of more note in the history of sheep on account of the wonderful disposition to fatten created by Bakewell, and by the great quantity of fat existing in proportion to lean. It is also regarded by many as the most valuable of the long-wool sheep. "The principal recommendations of this breed," according to YOUTT, "are its beauty and fullness of form, comprising in the same apparent dimensions, greater weight than any other sheep; an early maturity, and a pro-

pensity to fatten, equalled by no other breed; a diminution in the proportion of offal, and the return of most money for the quantity of food consumed." They are large and heavy, of good constitution, and hardiness and fecundity, but are poor nurses. They require rich pastures and feed. Mutton, rather too fat for the table. This breed is not a general favorite with American farmers.

"Our long cold Winters," says Dr. HENRY S. RANDALL, in his excellent work on Sheep Husbandry in the South, "but more especially our dry, scorching Summers, when it is often so difficult to obtain the rich, green, tender feed in which the Leicester delights, robs it of its early maturity, and even of the ultimate size which it attains in England. Its mutton is too fat, and the fat and lean are too little intermixed, to suit American taste. Its wool is not very salable, from the much to be regretted dearth of worsted manufactories in our country. Its early decay and loss of wool constitute an objection to it, in a country where it is often so difficult to advantageously turn off sheep, particularly ewes. But, notwithstanding all these disadvantages, on rich lowland farms, in the vicinities of considerable markets, it will always probably make a profitable return."

Cotswolds.—This breed is a cross of the Lincoln and Leicester; the sheep are superior to the Leicesters in weight of wool, hardiness, and vitality. They are much more prolific, and are excellent nurses. They have good form and size, the rams often attaining a weight of three hundred pounds. Wool of moderate fineness, long, white, and strong, the fleeces averaging eight or nine pounds. They make large early lambs.

Very valuable experiments were made in England, in the space from 1850 to 1853, by J. B. LAWES, as to the breed of sheep that would produce the most meat with the least amount of food. The sheep experimented upon were Cotswold, Leicester, Sussex, and Hampshire Downs, cross-bred wethers, and cross-bred ewes. Every particle of food was charged to each lot, and returns accurately kept. Without going into details, the grand result was that, in comparison to Downs, the Cotswolds consumed the least food to produce a given amount of increase, and yielded more than half as much again wool. In comparison with the whole the Cotswolds gave, by far, the greatest increase weekly, being nearly one-fourth more than Hampshires, which were second in order of

increase, and half as much more than Leicester, Sussex Downs, and cross-bred wethers and ewes. The Cotswolds and Leicesters cut the heaviest fleeces, both per head and per hundred pounds of live weight of animal—Cotswolds taking the first rank, then Leicester, cross-bred Hampshire and Sussex. The Cotswolds had more tendency to increase and fatten for the food consumed than any other.

Another experiment was tried by Lord KINNAIRD, where Cotswolds were bred against Leicesters, the result being that from exactly the same quantity of food, the Cotswolds gained seventeen shillings in value where the Leicesters only gained eleven shillings eight pence farthing.

The *Prairie Farmer* says: "The Cotswold sheep will shear from ten to sixteen pounds of combing wool to the fleece, that will not lose more than one-fourth in its preparation for the spindle, well adapted to the manufacture of all kinds of goods for which combing wool is used, and worth more per pound of late than any description of carding wool. The carcass of a Cotswold wether will weigh at two years old, two hundred pounds, and be worth more per pound by several cents in any market, than a sheep that will weigh from ninety to one hundred and twenty pounds. They cross well with either the Merino or South Down, adding greatly to both weight of fleece and carcass when crossed on the Merino; while the wool of a half-breed is worth more per pound in the fleece than the wool of a pure-blooded Merino, from the fact that the per cent. lost by cleansing is nothing like so much."

South Down.—This breed of sheep is prized particularly for the superior quality of their mutton. In the English markets as well as in this country, the precedence is conceded to the South Down's meat. But where weight of carcass is the desideratum they will fall short of some of the larger breeds. They are early to mature and readily lay on flesh. YOUTT says the South Down "has a patience of occasional short keep, and an endurance of hard stocking equal to any other sheep. The ewes are prolific breeders and excellent nurses." The South Down buck is always profitably introduced into any flock, improving every breed upon which he is crossed.

Of the wool, Colonel RANDALL says: "The extremely low character of South Down wool for carding purposes may be regarded as definitely settled. But as it has deteriorated it has

increased in length of staple in England, and to such an extent that improved machinery enables it to be used as a combing wool—for the manufacture of worsteds. Where this has taken place it is quite as profitable, in England, as when it was finer and shorter." It is deficient in felting qualities; makes a coarse hairy cloth, and is much used for flannels and baizes.

There are the Oxford, Shropshire, and other improved varieties of the Downs, resulting from crosses on short-wool stock—but these are not much known in this country.

Cheviot.—This is a very tough, hearty, hardy breed, excellent for the grazier, with a fleece too coarse to furnish a good carding wool, and rather short for the best combing wool; not a very desirable sheep to propagate. There has, however, lately been much improvement.

Merino.—This Spanish variety is distinguished as the fine-wool breed. There are many families, but they all retain to a remarkable degree their prominent peculiarities, which are fineness of wool, comparatively small size, short legs, hardness and longevity, patience and docility.

"Accurately conducted experiments have shown that the Merino consumes a little over two pounds of hay per diem, in Winter; the Leicester consumes from three and a half to four; and the common-wooled American sheep would not probably fall short of three. The mutton of the Merino, in spite of the prejudice which exists on the subject, is short-grained and of good flavor, when killed at a proper age, and weighs from ten to fourteen pounds to the quarter." Many of our Merino flocks have been injured by crossing with the overdelicate Saxon sheep.

American Merinos.—These are an improvement on the Spanish and may be classed as the Jarvis, the American Infántado, Atwood, and Panlar. They are of large size, short-necked, short-hipped, broad-shouldered, round and symmetrical, skin loose and mellow, and of a deep rose color; wool short, very yolky, and of a quality, style, and evenness scarcely surpassed. Various breeders have produced a fleece from about six to ten pounds; some of the heaviest ram fleeces weighing about thirty pounds.

Sixty years ago there was not a pound of fine wool raised in the United States or England; all the Merinos being carefully kept by the crown and nobility of Spain. In 1809, Mr. JARVIS, American consul at Lisbon, purchased some fourteen hundred head from the crown

flocks, and sent them home. These were the source of our immense flocks of fine-wool sheep.

No better Merinos are raised anywhere in the world than in the United States. At the great international fair at Hamburg, the two first prizes were taken by twelve Merinos, owned and exhibited by GEORGE CAMPBELL, of Vermont. European breeders were astounded that a Yankee flock should bear away the prize, contested for by the choicest specimens from Prussia, Silesia, and Spain. The prize sheep were immediately bought by a Silesian count to improve his breed.

The reason for the superiority of our best flocks, a fact established by many comparisons, is distinctly explained by JOSEPH L. BUDD,* as follows: "For years the European breeders had been engaged in a special system of overimprovement. Extra fineness and oiliness of staple has been sought after at the expense of the real stamina and vigor of their flocks. The original Spanish sheep imported to this country by JARVIS, and HUMPHREYS, were probably about the same as those scattered through Europe. The ideal standard of our breeders, though, was entirely different. The problem given them to solve was something like this. Given a thin, active, fine, though short-wooled sheep, with good constitution, to establish a breed heavy in neck and body, symmetrical in form, full of vitality, and with compact, oily, lustrous, and evenly crimped fleeces, of a fineness and length, suitable for the best combing wool. How perfectly this has been solved, the best flocks of the East and West proudly show."

Look out for the bogus Merinos—"full-blood bucks"—which are scattered throughout the West, and sold at extravagant prices. Says Mr. BUDD: "Through all the Eastern States they have had for years a class of Merino sheep, resulting from a cross of the Saxony upon the original native flocks. These small-boned, fine-fibered and woolled Merinos have again been crossed with American Merino bucks, resulting, after being properly blacked, in the soft, silky, slim-bodied "black-tops," which are scattered so profusely in every Western neighborhood. Within twenty miles of the place from which I write are perhaps two hundred bucks of this kind, bought at prices ranging from fifteen to one hundred dollars."

The Mauchamp Merino.—This is a new type of the Merino, originating some years ago on

*See Iowa Agricultural Report for 1865.

the Mauchamp estate, in France, and perpetuated and improved by its enterprising farmer, M. GRAU. These sheep, as now bred, produce a straight, strong, smooth, silky wool, similar in form to the long English wools, but very much softer and finer.

JOHN H. KLIPPART, translates an essay* on this breed, of which we give a brief abstract. The wool has some resemblance to the down of the Cashmere goat, and it is believed that Mauchamp rams can be profitably used to improve very greatly fleeces now much used in manufactures. The early defects in form presented by these sheep, have been bred out by careful selection, until a new type has been established and "fixed," producing wonderfully silky wool, while ultimately presenting an acceptable meat-offering at the shambles.

The new breed is said to require the same food as the old breed; to attain the same average weight, to produce a wool less in quantity but considerably better in quality—"the silky wool always selling twenty-five per cent. higher than the Merino wool." It is used in France in the manufacture of Cashmere warps, "giving them more strength without impairing their brilliancy."

The Most Profitable Breed.—Dr. RANDALL, sets forth and argues at some length that the pure Merino is the most profitable sheep for the South. We extract:

"In instituting a comparison between breeds of sheep for wool-growing purposes, I will, in the outset, lay down the obviously incontrovertible proposition that the question is not what variety will shear the heaviest or even the most valuable fleeces, irrespective of the cost of production. Cost of feed and care, and every other expense, must be deducted, to fairly test the profits of an animal. If a large sheep consume twice as much food as a small one, and give but once and a half as much wool, it is obviously more profitable, other things being equal, to keep *two* of the smaller sheep. The true question then is, *with the same expense in other particulars, from what breed will the verdure of an acre of land produce the greatest value of wool?*

"Let us first proceed to ascertain the comparative amount of food consumed by the several breeds. There are no satisfactory experiments which show that *breed*, in itself considered, has any particular influence on the

quantity of food consumed. It is found, with all varieties, that the consumption is in proportion to the live weight of the (grown) animal. Of course, this rule is not invariable in its individual application, but its general soundness has been satisfactorily established. SPOONER states that grown sheep take up three and a third per cent. of their weight in what is equivalent to dry hay per day, to keep in store condition. VEIT places the consumption at two and a half per cent. My experience would incline me to place it about midway between the two. But whatever the precise amount of the consumption, if it is proportioned to the weight, it follows that if an acre is capable of sustaining three Merinos, weighing one hundred pounds each, it will sustain but two Leicesters weighing one hundred and fifty pounds each, and two and two-fifths South Downs weighing one hundred and twenty-five pounds each. Merinos of *this weight* often shear five pounds per fleece, taking flocks through. The herbage of an acre, then, would give fifteen pounds of Merino wool, and but twelve pounds of Leicester, and but nine and three-fifths pounds of South Down (estimating the latter as high as four pounds to the fleece)! Even the finest and lightest fleeced sheep, ordinarily known as Merinos, average about four pounds to the fleece, so that the feed of an acre would produce as much of the highest quality of wool sold under the name of Merino, as it would of New Leicester, and more than it would of South Down! The former would be worth from fifty to one hundred per cent. more per pound than either of the latter! Nor does this indicate all the actual difference, as I have, in the preceding estimate placed the live weight of the English breeds low, and that of the Merino high. The live weight of the four-pound fine-fleeced Merino does not exceed ninety pounds. It ranges from eighty to ninety pounds, so that three hundred pounds of live weight would give a still greater product of wool to the acre. I consider it perfectly safe to say that *the herbage of an acre will uniformly give nearly double the value of Merino, that it will of any of the English Long or Middle wools.*"

In contrasting the Spanish and American Merino with the finer-wool Saxon Merino, Dr. RANDALL, says: "The four-pound, fine-fleeced Merino would be a far more profitable animal than the Saxon, other things being equal. But other things are not equal. The former is

*See Ohio Agricultural Report for 1867.

every way a hardier animal, and a better nurse. It is about twenty pounds heavier, and, therefore consumes more feed; but I consider this additional expense more than counterbalanced by the additional care and risk attending the husbandry of the Saxon. If required to keep the number good, and give the proper attention to the rearing of lambs, I would sooner engage to keep, at the same price, one thousand such Merinos for a year, than to keep the same number of Saxons."

The Doctor bears the following testimony to the value of a full-blood ram: "A grown ram may be made to serve from one hundred to one hundred and fifty ewes in a season. A good Merino ram will, speaking within bounds, add more than a pound of wool to the fleece of the dam, on every lamb got by it, from a common-wooled ewe. Here is one hundred or one hundred and fifty pounds of wool for the use of a ram for a single season! And every lamb subsequently got by him adds a pound to this amount."

Effect of Food on the Wool.—It is a fact generally understood that well-fed sheep produce more and better wool than poorly-fed ones. But it is also a fact, equally confirmed by science and practical experiment, that one kind of food will produce more wool than another.

No doctrine is more clearly recognized in Agricultural Chemistry, than that animal tissues derive their chemical components from the same components existing in their food.⁶ The analyses of LIEBIG, JOHNSTON, SCHERER, PLAYFAIR, BOECKMANN, MULDER, etc., show that the chemical composition of wool, hair, hoofs, nails, horns, feathers, lean meat, blood, cellular tissue, nerves, etc., are nearly identical. The organic part of wool, according to JOHNSTON,[†] consists of carbon 50.65, hydrogen 7.03, nitrogen 17.71, oxygen and sulphur 24.61. The inorganic constituents are small. When burned, it leaves but 2.0 per cent. of ash. The large quantity of nitrogen (17.71) contained in wool, shows that its production is increased by highly azotized food. This is fully verified by the experiments made on Saxon sheep, in Silesia, by REAUMUR, whose table we append. A striking correspondence will be found to exist

between the amount of wool and the amount of nitrogen in the food:

KINDS OF FOOD.	Increase of weight in live animal.		Produced wool.		Produced tallow.		Nitrogen per cent. in food.
	lbs.	oz.	lbs.	oz.	lbs.	oz.	
1000 p-pounds of raw potatoes, with salt.....	46½		6	8¾	12	5½	0.26
1000 " " " " " "	44		6	8	10	14½	0.26
1000 " " " " " "	38		5	3½	6	5½	0.21
1000 " " " " " "	34		14	11	41	6	0.23
1000 " " " " " "	17½		13	13½	59	9	2.09
1000 " " " " " "	90		13	14½	35	11½	2.00
1000 " " " " " "	83		12	10½	33	8½	2.00
1000 " " " " " "	18½		9	12	40	8	1.70
1000 " " " " " "	136		11	6½	60	1	1.90
1000 " " " " " "	120		10	4½	32	8	2.10
1000 " " " " " "	58		7	10½	12	14	1.15
1000 " " " " " "			5	8	6	11	
1000 " " " " " "	31		6	1	4	0	
1000 " " " " " "	35						

Feeding Racks.—When the ground is frozen, sheep will eat hay better from the ground than from any other lodge. When it is soft, or foul with manure, they will scarcely touch hay placed on the earth. One of the best feeding-troughs for sheep is shown in the annexed cut, Figure 1, from the *Annual Register*. It combines more advantages than any other we have met with, and proves on trial, to answer an excellent purpose, both for feeding grain and chopped roots, and as a rack for hay. Troughs

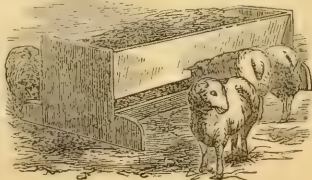


Figure 1.

⁶For full information on this whole subject, see LIEBIG'S Animal Chemistry, Part I and II.

[†]See JOHNSTON'S Agricul. Chemistry—Lecture XVIII. Analyses of the horny tissues, by SCHERER, will be found in the Appendix to LIEBIG'S Animal Chemistry.

similar to this have been made for many years, with the exception of the *double trough* below, an improvement described by GEO. GEDDES.

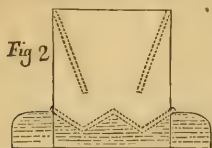


Figure 2 exhibits a section across one of the ends, and shows the structure without any description. A single board, as a roof, will, if needed, preserve the fodder from the weather or rain. The space between the upper and lower troughs should be just sufficient for the sheep to abstract the feed, and which will wholly prevent the chaff and seeds from entering the wood.

Propagation.—Many of the best “natives”—so called because they are acclimated hybrids, whose pedigree has been lost in crossing—are excellent to breed from; but the ram should always be a thorough-bred of some approved stock. JULIAN WINNE, an eminent stock-breeder of New York, said in a Prize Essay published in the *Cultivator*: “If the flock is to be bred for mutton and wool only, it matters not much (for one cross, and one cross only) what the ewes are, provided they are not little Merinos; as I have had lambs that were dropped by small inferior ewes by a thorough-bred Leicester ram, able to compete, as far as weight and wool were concerned, with those from thorough-bred mothers. I buy from various breeds, but *always the best sheep*. I have learned to expect the best returns from sheep that are three-quarters or a half Leicester. When an animal is half or more Leicester, I have no trouble in making him drop, with good keep, one hundred pounds mutton at twenty months old.”

Mr. WINNE is a thrifty farmer, living a few miles from Albany. For eight or ten years past he has beaten all his neighbors and equaled any man in New York in the art of making profit by buying lean sheep and selling them fat. He makes more mutton than any other sheep-feeder in the State. We quote at some length from the excellent essay, which we find in the *Cultivator*, wherein he reveals the secret of his art:

“Management in Breeding.—The ewes should be in good feed for two or three

weeks before putting the ram with them. Have the ram also in good thrifty order, feeding him for two or three weeks previously from one pint to one quart of oats, or oats and corn, or peas, per day. Tag the ewes, and do not leave the ram with them more than twelve hours out of the twenty-four. Keep both ram and ewes well through the Winter, by feeding not only hay, but also a few roots, and a little grain, if necessary, every day.

“Shelter, etc.—Treatment of Colds.—Have good sheds, with small yards attached for good weather, but do not allow them to get wet in cold weather, under any circumstances, as one wetting to the skin, when it is cold, will reduce them more than you can replace by good feeding in two weeks. Give them plenty of clean bedding at least once a week, and oftener, if necessary. Let them have access to pure water at all times, and have it, by all means, right in their yards. There should also be a box, with salt in one end of it, and salt and wood ashes in the other, in the yards, *never suffered to get empty*. Feed occasionally a little browse, pine or hemlock; or, if this can not easily be obtained, add a little rosin or niter to their salt about once a fortnight. Smear their noses with tar at least three times in Winter, and three times in Summer—in Summer immediately after shearing, as that will help to prevent their taking cold; about the first of August, as at that time flies are very troublesome, and the tar will keep them away; about the middle of October, which is about the time they should be tagged and the ram put with them.

“Lambing Time.—Three or four weeks before lambing time increase your grain and decrease your roots, as the latter, in too large quantity, are apt to cause too large a flow of milk and injure the udder; while, with too little grain, the ewes are not strong enough at lambing. During the season of lambing they should be watched very closely, and assisted a little—very carefully, however—if necessary. Be sure that the lamb nurses a little after an hour or two; and if the ewe, as is frequently the case with young mothers, is not disposed to let her lamb suckle, hold her a few times while the lamb is nursing, and this will generally remove all difficulty in the future. If lambs come in Winter, the ewes should be in a dry, warm place, with plenty of clean litter.

“Spring and Summer Treatment.—When the lambs are about four weeks old they are to be docked, and castrated, if the latter is to be

done at all, as at this age I never knew them to suffer in the least from the effects of it. Poor pasture and cold storms are ruinous to both sheep and lambs—therefore do not turn them out too early, and continue a little grain for ten or fifteen days after turning out, or until they have plenty of good pasturage. In Summer they should have a field with plenty of running water, and a few shade trees, if possible, and if it is a little hilly, so much the better. If the grass at any time scours either the sheep or lambs, tag them as soon as they are better of it, as such ones will sometimes get maggotty and die if neglected. About the middle of August, wean the lambs, removing them as far as possible from their mothers, as both will quiet down much sooner if they can not hear each other. The lambs should be put on the best feed attainable, and the ewes on the poorest; and, after a few days, examine the latter, and if their udders are hard or caked, milk them out and rub with a little sturgeon oil or arnica, either of which will not only soften the udder, but also dry up the milk. As soon as the ewes are all right in this respect, put them on good feed again to recruit for Winter.

“Wintering the Lambs—Yearling Wethers.”—Two or three wethers or dry ewes should be put with the lambs when they are weaned, to keep them tame; and, if the feed is not of first quality, give them daily a few oats, and the old ones will soon teach the lambs to eat the grain. About October 1st, separate the ram and ewe lambs, and keep them separate from that time until the next shearing, unless it is desired that the ewe lambs should breed, which I consider very bad policy, and never, under any circumstances, allow. Continue feeding a little grain to the lambs all through the first Winter, and until about shearing time, when it should be omitted altogether. After harvest, such yearlings as are to be fattened the first Winter may begin to receive a little grain; and I have found by experience that this is the most profitable time to prepare them for market, all things considered. When Winter sets in slowly increase the quantity until it reaches one quart per day for each sheep; and, with a good breed and good management, yearling wethers can be made, as I have repeatedly done, to weigh from one hundred and ninety to two hundred and forty pounds live weight, and dress from one hundred to one hundred and and forty pounds of

mutton before they reach two years old. The result, at present prices, I compute as follows:

MONEY RETURN.

Say 200 pounds live weight at 12 cents, is	\$24 00
First clip of wool, 10 pounds.....	10 00
	\$34 00

COST OF RAISING AND FATTENING.

Pasture, first season, about.....	\$1 00
Grain, the first year—say 5 bushels oats.....	5 00
Hay, first Winter, 150 pounds at 14 cents.....	1 87
Pasture, second year—say.....	2 00
Feed, second Winter 4 bushels oats and all meal.....	5 50
Hay, second Winter—say 200 pounds.....	17 57

Balance to credit of sheep.....\$16 13

“The Yards and Stables.”—It is very bad policy to wait until snow comes, to get the yards and stables ready. By commencing early, and, if there is a saw-mill near at hand, by hauling into the yards and stables four or five inches of sawdust, the stable floors will not only be saved, but the liquid manure from the sheep is also preserved, making a very valuable addition to the compost heap, especially for heavy land. As soon as the trees shed their foliage, rake and haul in on top of the sawdust, leaves to a depth of five or six inches more, and the two will together make plenty of bedding for at least four weeks, by stirring up the leaves a few times. With the present price of straw, a month's bedding saved is worth looking after, aside from the probability that all the straw may be needed before Spring, even after taking this precaution.

“Before the sheep are brought in in the Fall, I put up three partitions on the upper floor, and three on the lower; this gives me four pens above and four below, each eighteen by twenty feet. Into each of these pens go forty-five sheep; one hundred and eighty on the upper floor and one hundred and eighty below—three hundred and sixty under one roof. My manure is very rich. I hope to make two blades of grass grow where one grew before by this system. I think I have three, and my neighbors say four extra blades.

“The above preparation over with, the feeding boxes should be taken out, at leisure, and cleansed by sprinkling the inside with slacked lime—thus removing that greasy smell which there would otherwise be about them. Put them where needed, upside down, and when the snow comes, there will be nothing to do but turn them over, straighten them up, put in the feed, and let the sheep come.

“Properly Regulating the Feed.”

By feeding liberally with roots, and not too

much grain, during the first week, at least, the change from green feed to dry, will be less apt to affect the sheep. In feeding, unless a person can do it himself, which is very seldom the case, the feeder should be instructed with great care, how much grain is to go to each yard or stable, according to the animals it contains. An overseed at the commencement is almost sure to bring on the scours, and after they are over, it will take at least two weeks' good feeding to put the sheep back where they started from. My mode, to avoid mistakes, is to number my yards and stables, and count the sheep in each yard and stable—allowing to each sheep one-half pint of grain per day to start with, unless they have been fed grain previously, when I allow a little more. I then make out a schedule, thus: No. 1, sixty sheep, at one-half pint per day, is fifteen quarts which divided in two feeds is seven and a half quarts to a feed; so I write on the schedule, 'No. 1, sixty sheep, must have seven and a half quarts at a feed, morning and night.' No. 2, at the same rate according to number, and so on until I get them all. This paper is tacked up in the place where the feed is kept, and by going with the feeder a few times, to show him and see that he makes no mistakes; if he is a good man, he can do it as well as the farmer himself. As soon as the feed is to be increased, a new schedule is made out accordingly, and so on, until the sheep are fed one quart each per day, when I consider them on full feed, especially if the feed is corn, beans, or oil meal, or a mixture of either.

"Regularity in Feeding.—Regularity of hours is very important. Sheep should not be fed one morning at five o'clock, the next at six, and the third at seven. The day I write, owing to the illness of one of the boys, I have had an example in point; on going out at five, a board was found off at the stable, and an end out of one of the feeding boxes. To replace these, was a job of some time, and the grain only had been fed when the breakfast bell rang, leaving the sheep without their hay. I remarked to my man that this mishap would cost us 'all the day's feed,' which I verily believe to be the case. Our rule is this:

"Grain and oil meal are fed at half-past five A. M. As soon as the grain is finished, hay is given—no more than the sheep will eat clean. The different yards and stables are carefully fed each day, *in the same order*, which is important to avoid confusion and mistakes—begin-

ning with No. 1, and so on through the list. After breakfast water is given, going around twice, to see that all are well supplied. The roots are next cut (*ruta bagas*, which I consider best), and of these, to my present stock of about three hundred and fifty sheep, I am now feeding ten bushels a day. At eleven o'clock, straw is fed. Twelve is the dinner hour, and immediately after dinner the roots are fed. The troughs and tubs are now all examined, and replenished with water, if necessary—also salt, salt and ashes, browse, litter and anything else that may be needed is supplied. The evening and next morning's feeds of grain and oil meal are prepared, and hay got ready for both night and morning. At 4 P. M., feeding the grain is again commenced, followed as before by hay, after which the water tubs and troughs are emptied and turned over, and the work is finished for the night.

"Illustrative Experiments.—It is very desirable to know with some precision what gain in weight should be counted upon in feeding. I find that with the amount of grain above mentioned, the average quantity of hay consumed is rather less than above, one and a half pounds per head per day. When sheep are fed three months, the total quantity of grain consumed I reckon equal to two and a half months, at one quart each per day—two months of the three being at this rate, and the first month, which is consumed in getting by degrees up to full feed, not averaging more than one pint each per day.

"The following is the result of an experiment tried in 1860, with thirteen sheep, each accurately weighed at the dates specified:

	Weight Jan- uary 3.	Weight Feb- ruary 3.	Gain,
No. 1. Ewe.....	235	283	17
" 2. Wether.....	242	232	10
" 3. ".....	235	250	15
" 4. ".....	226	236	10
" 5. Yearling ewe.....	202	219	17
" 6. Ewe.....	213	237	24
" 7. ".....	188	205	17
" 8. ".....	182	185	4
" 9. ".....	194	215	21
" 10. Wether.....	173	193	15
" 11. ".....	194	203	14
" 12. ".....	183	196	13
" 13. ".....	179	192	13
Total.....	2,650	2,841	190

Average gain in 31 days, $14\frac{1}{2}$ pounds per head.

"Quality and Care.—All the other sheep I was feeding were likewise weighed at both the above dates, and I subjoin the figures to show, among other points, that the larger the sheep, as a general rule, the greater the gain, and, in

the case of the last lot on the list, how much this gain is reduced by lack of proper shelter, a deficiency in accommodations obliging me to keep these sheep (No. 9 on the list) in a shed upon a large open lot. The system of feeding adopted was the same with all except that the large sheep may perhaps have had a trifle the most:

No. of lot.....	WHERE KEPT.	No. of sheep in the lot.....		Average gain of each sheep in thirty days.....				Total weight gained by all sheep in thirty days.....
		Head.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
1.	Stable.....	13	2,670	201	2,469	136	143	3,005
2.	Stable.....	18	3,977	171	3,806	122	125	2,103
3.	Open yard and shed.....	83	12,140	100	12,040	650	650	5,290
4.	Stable.....	60	9,153	152	8,999	300	300	1,854
5.	Stable.....	40	6,637	151	6,486	316	316	1,272
6.	Close shed.....	20	3,392	137	3,255	150	150	2,905
7.	Open yard and shed.....	77	10,322	117	10,205	281	281	2,124
8.	Stable.....	73	9,914	136	9,778	191	191	1,385
9.	Shed and open field.....	70	8,241	126	8,115	368	368	2,747

"Total number of sheep, 504—average weight January 3, 143½ pounds per head—February 3, 150½ pounds—average gain per head on the whole, 7½ pounds, nearly. As the best lot of thirteen gained in weight twice as rapidly as the average of the whole, the importance is shown of selecting the *very best sheep* in purchasing for fattening.

"Feeding Roots.—The account current with one lot of the sheep I am feeding this Winter gives a considerably better average increase in weight than the above, and also forcibly illustrates the value of ruta bagas in feeding. This lot of sheep consists of 300 head which reached my farm about November 20th; market value, \$10 07 per head. They were pastured a fortnight, when I began feeding. About the middle of December they were housed, and the feed slowly increased until January 1st, when it reached the full feed specified, of one quart per head per day. It consisted of half oats and half oil meal up to about this time (January 20th). I have now substituted Indian corn for the oats—about 2½ bushels corn unground, mixed with 300 pounds oil meal, constituting the daily food of the 300, valued at:

300 lbs. oil meal, cost me \$70 per ton.....	\$10 50
2½ bushels corn, at \$1 90 per bushel.....	4 75
8 roots—would sell for 37½c. per bushel, but this much exceeds cost of production.....	3 00
1½ lb. per day hay to each, 450 lbs.....	4 95
Cost of feeding 300 sheep per day.....	\$23 20
Or an average per head of about 77½ cents per day.	

"The sheep are gaining unusually well—a fact which I ascribe to the increased quantity

of roots I am feeding them as compared with former years."

"About the middle of February," adds the editor of the *Cultivator* in a note, we received from Mr. WINNE, a statement of the results with the three hundred sheep referred to above, which we are obliged to present in condensed form:

Estimated average weight of the 300 at this date, 150 lbs. per head—has been offered 12c. per lb. live weight.....	\$19 50
Total amount of feed, exclusive of pasturage, is considered equal to 90 days' full feed at above rate to this time—per head.....	\$ 4 64
Money value, when feeding began.....	1 07
Profit per head, exclusive of attendance, but with no allowance for manure.....	\$ 1 71

"This gain, it should be remembered, is after selling the hay to the sheep, at the barns, at \$22 per ton, the corn at \$1 90 per bushel, and the ruta bagas at 37½ cents per bushel; and, on the 300 sheep, considering the shortness of the investment, the profit is certainly a very pretty one."

Sheep Manure.—"As to the value of sheep manure," observes Mr. WINNE, in conclusion, "and the effects resulting from its liberal application, I have never kept much other stock, and I may be permitted to add that twenty-seven years ago, when I came on to this farm, I cut from about 60 acres of land the first year 25 tons of hay. Year before last I cut from precisely the same number of acres, 100 tons, and last year (a season of severe drouth) 90 tons. When I began on the farm I had one barn 32 by 40 feet, which held all the crops it produced. I now have one barn 44 by 52 feet, 20 feet posts; one shed 21 by 36, 18 feet posts; one 21 by 24, 16 feet posts; one 30 by 72, 18 feet posts, and one barrack that will hold 17 tons of hay. Summer before last they were *all full*. Two rules I laid down, never to lose sight of, when I commenced farming for myself: 1. To deal honorably with mother Earth—that is, to plow well, harrow well, give her all the manure I could, and never sell my straw, but keep it all for the land, and I assure you I could soon see an improvement. 2. Never to buy anything (except manure) I could possibly do without, until I had the money to pay for it—for manure, when it could be had, I was never afraid to run in debt. These two rules I have strictly adhered to, and must attribute much of my success to their benign influence."

Corn for Sheep.—LEWIS CLARK, of

Beloit, recommends the readers of the *Wisconsin Farmer* to grow and largely feed corn for sheep. He says: "Plant six acres of corn for each one hundred. Corn planted in rows, four feet each way, gives in round numbers 2,700 hills to the acre. Six acres will give 16,200 hills. In the five months, commencing December 1st, and ending May 1st, there are 151 days. If you feed the one hundred sheep, 100 hills of corn, each of those days, you will have 1,100 hills left. I generally reckon five and one-half acres, as the sheep will not usually need one hill each toward the last of April, and perhaps not quite that as soon as the first of December. Then again, I usually commence about the middle of November to feed, and come on to the full feed gradually. If first of December is cold, they will want their full feed, as it is economy the wrong way to let sheep lose flesh in the beginning of Winter. Falling away then and subsequently increasing their flesh will cause the shedding of wool. Who would have imagined that twenty-four acres of land would Winter four hundred sheep? Who does not believe that one hill of good corn is enough to keep one Spanish Merino sheep one day, if it is cut up before the frost comes, is well-cured, and fed to the sheep, stalks, leaves, husks, and corn?"

Summer Shelter.—Summer shelter for sheep, and indeed, for stock of all kinds greatly promotes their comfort, and therefore, their health and growth. We rather like the idea of SOLOMON GREEN, of Townsend, Massachusetts, who says he has kept sheep thirty years, and advises to have small buildings erected in sheep pastures, made dark, so that the sheep by going into them may avoid the flies. He says that the sheep will go in at eight o'clock in the forenoon, and remain till four o'clock in the afternoon. "The house," he says, "should be built on runners, so that it can be moved, and this will enrich the land. A house twelve feet square is sufficient to hold a dozen sheep and their lambs. Move it its length once in two or three weeks."

This, it will be seen, accomplishes two objects. It protects the sheep, inducing them to keep quiet during the heat of the day, and it thoroughly manures the pasture at a trifling expense of time. In this way you may fertilize the top of gravelly knolls and sand hills. The lower places will take care of themselves from the wash of the higher.

To Ascertain the Age.—The age of the ram may be ascertained by the number of rings or knobs on his horns, but from the large number of hornless sheep, and many other reasons, it is safer and more satisfactory to determine the age by the teeth. The sheep has eight cutting teeth in the front of the lower jaw, and six molar or grinding teeth in each jaw—above and below. When the lamb is born it sometimes has no cutting teeth, but it generally has two, and before it becomes a month old, the full number, eight, appear in the lower jaw. When one year old, it sheds the two middle teeth, and within six months from the time of shedding, their places are filled with two wider than the first. At two years, the next two are shed, and in six months their places are filled with two wide teeth. At three years, the two third teeth from the center are shed, and their places are filled with two wide teeth, and at four years the corner teeth are shed, and by the time the sheep are five years old, will have grown out even, and it will have a full mouth of teeth. After that, the teeth begin to grow round and long, and at nine or ten they begin to shed, and then is the time to fatten for the butcher, and let young sheep take their place.

Dogs and Sheep.—An Indiana sheep farmer says, that "a number of sheep, wearing bells, in any flock, will keep away dogs—he would allow ten bell sheep to every hundred or hundred and fifty. When sheep are alarmed, they run together in a compact body, in which act all the bells are rung at once, which frightens the dog, or makes him think some one is on his track, so he leaves without making mutton." Many sheep culturists in the land, however, know that bells are not an infallible preventive.

Another says: "To cure a dog of sheep killing, let him see the sheep he has killed; in his presence take off the pelt, fasten it tightly around him, and make him wear it from one to three days." Or, second, fasten him between two stout rams, the three abreast, and let them race him about the field awhile. It will open his eyes to the character of sheep. Or, third, cut off his head. Neither of these remedies will be effectual unless you can catch the right dog.

A Trap.—"I would recommend those having sheep killed to place them in a pile together, or to leave at least one of them where the dogs

have left it; then put four or six lengths of fence around the dead sheep, made of sawed scantling (a pen of straight rails will answer as well as scantling). Commence by placing the scantling on the ground, and as you lay them up, draw your scantling in, the width of them every time around, and build the fence high enough in this way that a dog can not jump it. Then lock the corners well, and you have a pen that dogs can go over into from the outside readily, and when once over, they can not get out again until they are helped out. In this way, in a few nights, you will be quite likely to get the very same dogs that killed your sheep, as they will have the curiosity or desire to go over the ground the second time."

Sheep kept with cows are not so apt to be killed by dogs as when alone. The cows fight for them.

This is a most serious matter; as the government statistician reported in 1866 no less than eight hundred thousand sheep killed or mutilated by dogs yearly; being a two per cent. tax on the total investment!

Shearing Apparatus.—An Ohio correspondent of the *Country Gentleman* furnishes that paper with the following: "Not having seen any notice of any improvement on the old-fashioned mode of shearing sheep—no doubt as uncomfortable for the sheep as the shearer—I thought I would send you a sketch of one I have been using for the last three years, which I find to be just the thing. It was first made and used by a neighbor who has followed shearing many years. It has these advantages—the shearer stands up to his work, having both hands free; the sheep can not injure itself by struggling, even if heavy with lamb, and you can shear faster and easier.

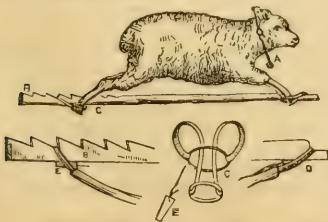


Figure 1.

Description.—A. Small rope, with iron ring in the end, passing through two holes in the table, and over the sheep's head.

B. Hickory stick seven feet long, two inches wide at the notched end, notches one and a half or two inches apart, for adapting it to the size of the sheep.

C. Shackles, made of two leathern straps, one inch wide, fastened to each end of a small iron ring, one and a half or two inches diameter, and passing and fastened to another ring two inches in diameter.

D. Forward end of stick B.

E. Wooden wedge, to fasten rings on the notched stick.

Mode of Operation.—The sheep is caught, turned on its haunches, and the under part of neck and between the fore legs are sheared; then lifted on the table or bench, the head placed under the rope, the leather shackles put on the feet, and stick inserted—as shown in the cut; one side is sheared, and then the sheep is turned over and finished. Hoping this may benefit some of my brother farmers, I submit it to your consideration."



Figure 2.

The editor endorses it, remarking that any assistance in performing the laborious and disagreeable work of shearing sheep will be especially acceptable to the farmer. He suggests an improvement, shown in Figure 2, representing two leathern loops at each end of a stick, through which the feet are inserted; and as the legs are extended these loops draw tight and hold the sheep fast. A sliding ring, with a pin and holes, accommodates it to the size of the sheep. Two-leather straps (not shown), nailed to the table, and connected by a buckle in the middle, then receive the neck of the sheep, as in the mode described by the correspondent.

Marking Sheep.—Says the *Western Farmer*: "The advantages of having every sheep in the flock marked with plain figures, such as can be easily read even across a common sheep-yard, are too obvious to every one to need any argument in its favor. The best materials for marking we have ever used are red lead and pure Japan. This mixture will work equally well whether you use iron or wooden types. Many try Venetian red, which looks very well at first, but it soon rubs off and the figures become obscure.

The numbers and ages are shown by marks on the ear, and these should be made when the

lambs are quite young, or a day or two old, when the dams are more readily known than after the lapse of some weeks. The mode of numbering adopted by the celebrated Von THAER has been generally adopted by which the numbers may be readily carried up to 1 000 or more. It is as follows:



Figure 1.



Figure 2.



Figure 3.



Figure 4.



Figure 5.

Figure 1—One notch cut in the left ear at the top, is 1. One notch cut in the left ear, under side, 3. One notch cut in the right ear, at top, 10. One notch cut in the right ear, under side, 30.

A combination of these notches easily makes any number up to 99.

Figure 2—One notch cut in the left ear, at the end, is 100. One notch cut in the right ear, at the end, 200.

Figure 3—The point of the left ear cut straight off, is 400. The point of the right ear, cut straight off, 500.

The figures furnish examples of these markings, to which are added the holes punched through to show the age. As no owner would make a mistake of ten years in the age, these marks are much simpler:

Figure 4—One hole in the left ear is 1. One hole in the right ear, 3.

In order to explain more fully these different marks, the following references to the figures are added:

Figure 1 is 1, 3, 10, and 30=44.

Figure 2 is 100 and 200=.

Figure 3 is 400 and 500=900.

Figure 4 giving the age, is 1 and 3=4; which means that the lamb came in 1854, or 1864, as the case may be—no hole indicating a year, as 1850, or 1860; a mistake of ten years in the age not being possible.

Figure 5 is an example showing a combination of these marks as follows:

1+30+30+100=161; and the lamb belonging to the year 1867.

The numbers being marked every year, and the age marked besides, there is no possibility of making any mistake in a single individual. By a book register, the number of the dam may be kept, the date or day of lambing, the ram, and any additional remarks.

The best marker is a saddler's spring punch, which may be used for cutting the notches by placing it at the edge of the ear; or for puncturing the holes in the middle. The holes should be about a fifth of an inch in diameter. If too small they will grow up when the wound heals.

Live and Dead Weight in Sheep.—The English rule is to weigh sheep when fattened, and divide the weight by seven and call it quarters. Thus, a sheep weighing one hundred and forty pounds would give twenty pounds a quarter as the dead weight. If the sheep are in good condition, this rule is sufficient for all purposes. Poor sheep will fall below the mark, and extra fat ones go over it.

To Cure Sheep from Jumping.—A correspondent of the *Ohio Farmer* gives the following curious account of the method adopted by him to prevent his sheep from jumping the fences of his pasture: "I want to tell you about my jumping sheep, and how I broke them. I got them in a pen sufficiently large to hold them. I then caught the ringleaders, one at a time, and made a small hole in each ear. I then took a cord or string, and run it through the holes in the ears together, close enough to keep them from working their ears; I then let them out, and they are as quiet as any sheep."

Brief Facts and Suggestions.—

Keep sheep dry under foot with litter. This is even more necessary than roofing them. Never let them stand or lie in mud or snow.

Count, every day.

Begin graining with the greatest care, and use the smallest quantity at first.

If a ewe loses her lamb, milk daily for a few days, and mix a little alum with her salt.

Do not let the sheep become frightened. Never allow a stranger into the yards unless accompanied by the feeder, or some one familiar with them. It sometimes puts them back two or three days.

Separate all weak, or thin, or sick from those strong, in the Fall, and give them special care.

If any sheep is hurt, catch it at once and wash the wound, and if it is fly-time, apply spirits of turpentine daily, and always wash with something healing. If a limb is broken, bind it with splinters, tightly, loosening as the limb swells.

If one is lame, examine the foot, clean out between the hoofs, pare the hoof if unsound, and apply tobacco, with blue vitriol, boiled in a little water.

Shear at once any sheep commencing to shed its wool, unless the weather is too severe, and save carefully the pelt of any sheep that dies.

In Summer, sheep drink five or six pounds of water every day, and when deprived of it, they eat less food and lose weight.

JOHN JOHNSTON writes the *American Farmer* that sheep fat more readily in October and November if they have first-rate pasture, than at any other season of the year.

To insure successful Wintering for a flock, these things, are, first of all, indispensable, namely: *Good shelter, food sufficient in quantity and variety, running water, and skillful attendance.*

No man who expects to make any improvement in his flock will allow a ram to "run with the ewes." Six or eight ewes in a day is as many as one ram ought to be allowed to serve when he has the very best of care; with a less number his gets would be much increased.

Lambs from pure-bred rams will be worth one-half more than those from common rams.

Much may be gained in Winter by changing from one variety of feed to another. A feed of well-cured corn fodder or straw will be relished three or four times a week.

The same ram should not be kept with a flock more than a year; neither should he be used in the flock that he was raised from.

There is no part of the United States, if there is of the world, where sheep are not better for some degree of Winter shelter. In western Texas and in the Gulf States, perhaps they demand no more than a pole-shed or dense clump

of trees to break the fury of the "northers;" north of latitude forty degrees to forty-two degrees, close barns or stables, with abundant ventilation, are beginning to be preferred by careful and systematic breeders. Shelter is food saved; strength kept, which would otherwise be lost; and wool improved by the good condition of the sheep, to say nothing about the most important points of all—the lambs which are to follow. A suffering sheep will produce a weak lamb.

Because of their omniverous habits, sheep are very valuable as scavengers on old farms, and as pioneers on new lands, in cleaning them of noxious weeds, bushes, briars, and burrs, almost all of which they will eat at some season of the year, or in some stage of their existence. But sheep generally imply good fences.

Diseases of Sheep.—Under this head we shall give approved remedies for a few of the common disease of sheep:

Apoplexy.—Bleed moderately; then give two ounces of Epsom salts in a gill of water.

Blackwater.—Keep the bowels open with Epsom salts; and give a tea-spoonful of elixir of vitriol, or sulphuric acid, diluted with seven parts of water, in an infusion of oak bark.

Blackmuzzle.—Mix an ounce of verdigris (acetate of copper), four ounces of honey, half a pint of vinegar; simmer them together over a fire for ten minutes in an earthen pipkin. Apply it to the mouth on a piece of rag.

Colic (Diarrhea—Scours).—Prevent by using great care in changing dry for green feed. A feed of sulphur is also said to be a preventive. The following is an English remedy: "Ten drops of laudanum, ten drops essence of peppermint, one tea-spoonful of the spirits of turpentine, and one table-spoonful of sweet oil." YOUTT modifies the prescription as follows: "Take of prepared chalk an ounce, powdered catechu half an ounce, powdered ginger two drachms, and powdered opium half a drachm; mix them with half a pint of peppermint-water. The dose for a lamb is from one to two table-spoonfuls morning and night."

Flies.—Certain flies sometimes deposit their eggs in the wool of sheep during the last weeks of Spring. The resulting maggots burrow under the skin, and often sadly torment the poor animals. Fly powder: Two pounds of black sulphur, half a pound of hellebore; mix them together, and sprinkle the sheep from the head to the tail with a dredging-box. Wash: The farmer will find this an excellent recipe: Half

a pound of powdered white arsenic (arsenious acid), four pounds and a half of soft soap. Beat these for a quarter of an hour, or until the arsenic is dissolved, in five gallons of water. Add this to water sufficient to dip fifty sheep. The quantity of arsenic usually recommended is too large.

Foot-Rot.—This is a formidable disease. We shall not discuss the question whether it is contagious; suffice it that it commonly appears among flocks kept in wet, filthy yards, or fed in rich moist pastures. It seems to be produced by foreign substances finding their way through the cracks in the hoof, and inducing acute inflammation within the foot. The disease is often long in culminating; it progresses gradually, first causing limping; then the lifting of one foot; then severe lameness of both fore feet; then going upon the knees, which brings the feet in contact with the breast. Then the feet become masses of rottenness; maggots breed in them and work into the flesh, and this corruption is communicated to the breast.

The cure, says the *American Agriculturist*, is very simple and sure: "The well-cleaned hoofs, softened by soaking in dewy grass or on a rainy day, or otherwise, are pared with cutting pliers and very sharp knives until every particle of diseased matter is taken away, even if it involves the removal of all the hoof; they are then washed with warm water and soap, and smeared with some caustic paste, or fluid, or the sheep forced to stand in a hot, saturated solution of blue vitrol for ten minutes."

YOUATT recommends, after the decisive cutting away of all diseased matter, the washing in a weak solution of chloride of lime (a pound of the powder to a gallon of water), and then an application of muriate of antimony with a swab. Dress and pare anew every day.

The *American Stock Journal* recommends, for the preparation, a pound of powdered sulphate of copper to four pounds of tar, smeared on with a brush after paring.

Phenic or carbolic acid, is mentioned as an effectual remedy in the early stages.

Grub in the Head.—This is another form of the bots; the fly, instead of depositing her eggs where they will be taken into the stomach, lays them upon the lining membrane of the nose, where the breath will soon hatch them, and whence the larvæ crawl up into the frontal cavities of the head. The great distress which sheep suffer from the attacks of this insect, can hardly be imagined by one who has not seen it. That death is occasioned by grub in the head

is not probable, but when great numbers exist in the head of a sheep, the irritation they produce, especially when they take their departure in May and June, is great.

But YOUATT argues that these grubs in the head, though they cause inconvenience and annoyance, do not cause any serious disease; that sheep never die from their depredations; that their presence in the head is possibly an actual benefit; and that it is doubtful if the worm ever eats a mouthful of anything—arriving at these conclusions, however, rather by deduction than induction. Hundreds of farmers in America are certain that they have lost scores of sheep by this parasite; and we append some remedies that have been proved.

To prevent the fly from laying eggs in the nose: Daub whale oil up the nostril occasionally with a feather; or bore shallow two-inch augur holes in the manger or in blocks, and fill with salt, smearing around the top with tar, so that it will stick to the nose.

Spirits of turpentine and corrosive poisons are sometimes used to expel the grubs; but they are dangerous and unreliable. A writer in the *Country Gentleman* uses a wash of one pound of Scotch snuff and some asafetida to one gallon of hot water.

The *New England Farmer* circumvents the intruders, and swindles them out of their habitation, by the following cute trick: "Take honey, diluted with a little warm water, a sufficient quantity, and inject into the nose freely with a four-ounce syringe. The worm will leave his retreat in search of a new article of food; and when once in contact with the honey, becomes unable to return, and slides down the mucous membrane. Then (say two or three hours after using the honey) give the sheep a little snuff or cayenne, and the effort of sneezing will place the worm beyond the chance of doing harm."

Lice and Ticks.—Sheep are infested by both lice and ticks—the latter far the more formidable. Tobacco juice, tar, mercurial ointment, are the usual remedies; though a single fifteen minutes' bath in warm water will drive all the lice from lambs. Hard-wood ashes, rubbed in, is also a good exterminator of vermin. THOMAS JAMESON sends the following to the *Western Farmer*: "Take the sheep on a warm day and lay it on its side, then with a piece of chalk draw a line from just back of the ear, along the side to the roots of the tail. Separate the wool, beginning immediately back of the ear and lay it open to the skin along this

line and sprinkle in *Scotch snuff*, closing up the fleece as you go along to prevent the snuff from being scattered and lost. Serve both sides of the sheep in this manner and in just forty-eight hours thereafter you may look for live ticks in vain."

Carbolic acid in a crude form is very effectual in destroying vermin or curing scab in sheep.

Poisoned Sheep.—Sheep will sometimes eat of poisonous shrubs. A certain remedy is found in blood-root and brandy—a strong extract—a table-spoonful to a sheep, and more to a calf. A decoction of strong black tea is said also to be an antidote.

Rot.—YOUATT estimates that "more than a million of sheep die every year from this disease." It is inflammation of the liver, caused, or at least aggravated, by the presence of the fluke-worm. The result is hastened by pasturing on ill-drained land, covered with decomposing grasses—salt-marshes excepted. It is affirmed that *sheep that have free access to salt will never have the rot.*

DOYLE recommends as a remedy: "Bleed freely and give glauber or Epsom salts." But if the malady has made much progress give it the butcher's knife. WILlich says that elder leaves will often effect a cure. YOUATT says that, after physicing, "two or three grains of calomel may be given daily, but mixed with half the quantity of opium, in order to secure its beneficial results, and ward off its injurious effects." Do not be sanguine of a cure in any but the first stage.

Scab.—YOUATT says it is not contagious, and recommends housing; shaving, wherever the skin feels hard; washing with soap-suds, and then, every other day, washing with lime water and a decoction of tobacco. A correspondent of the *Country Gentleman* has found salt and sulphur a sure cure for scab in sheep. He puts one-eighth or one-tenth part of sulphur with the salt and feeds as usual. DANIEL KELLY, of Du Page county, Illinois, contributed to the *Prairie Farmer* his remedy for this troublesome disease—which he thinks a sure cure: One pound mercurial ointment and three pounds of fresh lard, well-mixed together. Turn the sheep upon its back and anoint the bare spot under each leg, and also around each place where the "scab" has appeared. Keep the sheep from the weather a few days.

Crude carbolic acid is death to the scab, and is much used in England.

Sniffles.—WILLIAM P. HAYDEN informs the

Maine Farmer that equal parts of garget root, alum, and tobacco, steeped together, will cure the sniffles in sheep. It should be forced up the nostrils with a syringe.

Stretches.—Should any of the sheep get the stretches which they are apt to do when high fed, give a quid of tobacco half the size of a hen's egg, and if not relieved in twenty minutes give them a second dose, but nine times in ten the first dose cures. For stoppage in their water, give one tea-spoonful of spirits of niter, with the same quantity of spirits of turpentine, in half a gill of lukewarm water.

Goats.—The goat was coeval with the ox and the sheep, in those regions of the East where civilization first dawned upon mankind. He was a part of the mythological systems of the ancient nations. In the Scriptures he is constantly referred to as forming the wealth of patriarchal families. By the laws of Moses his meat was allowed to be used as human food, and he is ordained to be employed in remarkable religious ceremonies. "Thou shalt make curtains of goats' hair as a covering to the tabernacle," is a sacred injunction. The earliest Grecian and Roman writers speak of him as yielding food and raiment, and superstition connected him with the attributes and services of the gods.

The fleece of the goat has furnished man with his richest, most durable, and gorgeous attire; its nutritious and wholesome milk and meat have yielded him food; its skin has supplied the materials for water-sacks or bottles, morocco, etc., while the animal itself may be said to have lived on chips. But he doesn't live on chips if there is anything else he can bite. If milked regularly twice every day, one will yield a sufficiency for a small family. Goat's milk is very healthful, very nourishing, and is often prescribed for the sick during convalescence. The Irish have done more than any other people to introduce the goat among us, and the hairy scavengers have yielded a good deal of inexpensive milk.

HORACE GREELEY gave expression to the popular dislike of this quadruped, in the following letter to the editor of the *Agriculturist*:

"FRIEND JUDD—H. G. T., in the December *Agriculturist*, wonders what can be urged against the keeping of goats. I answer—not much, if you are living on the stony hills of Palestine, or the desert of Sahara, or the plains of Colorado, or the parched, desolate valleys of Utah, where a tree is unknown and

its production is barely a possibility. In fact, I think the goat destined to prove a great blessing to all that vast region lying westward of the banks of the Platte, and eastward of the Sierra Nevada. In a shade-blest, fruitful country like this, however, the goat is a nuisance and a terror. The utmost vigilance will not prevent the destruction of your rarest fruit and shade-trees, if you keep Billy and Nanny on your premises.

"I speak feelingly on the subject, for my experience has been a sore one. My last trial with a she goat (bought for her milk for an infant) and three young ones—all fine animals, but for their invincible propensity to eat anything that should not be eaten. I am not certain that either of them would have barked a crowbar, unless very hungry; but I would not like to insure the dry, cork-like rind of the big trees of California (from a foot to eighteen inches through) against the teeth of any goat I ever harbored. If you must have goats keep them, for their milk is the best food that can be had for young children; but tie them fast in some lot where nothing grows that you want to survive, or shut them up in a barn, and be sure they never have a chance of liberty. A goat at large on a Yankee farm will do more damage in a single week than can be repaired in ten years."

Goats emit at all times a strong and disagreeable odor, named *hircine*, which, however, is not without its use, for if one of these animals be kept in a stable, it is affirmed that it will be an effectual preventive of the *staggers*, a nervous disorder which is often very fatal to horses. Goats yield, on an average, two quarts of milk a day; some of the Maltese and Assyrian varieties give a gallon. Take him all in all, the common goat of the municipal gutter is rather an unprofitable citizen.

The Cashmere and Angora Goats.—The "shawl-bearing animal," which reaches such perfection in Cashmere, Angora, and other parts of Western Asia, is the only animal that produces a fabric worth its weight in gold. The supply of fleeces and goats is limited and precarious. Access to them is difficult and dangerous, owing to the jealousy of the governments and the barbarous bigotry of the people.

Dr. JAMES B. DAVIS, of South Carolina, and RICHARD PETERS, of Georgia, were among the earliest and most successful importers and propagators of the Cashmere goat,

and thousands of the best breeds are now owned in different States.

The Angora goat is a more recent arrival. The acclimatization of these goats in this country is an established fact. For several years, in different parts of the Union, the Cashmere and Angora goat have been bred, both pure and crossed with our native goat. Far from deteriorating by the transfer, as had been predicted, it is found that in some parts of the country even the unmixed breed of the imported goats has shown evident signs of improvement resulting from the change. This branch of pastoral industry has begun to assume very considerable prominence.

The Angora goat is the best variety of the wool-bearing animal, producing the finest and most lustrous mohair and fur used either in Europe or the East, for the most luxurious and expensive fabrics. He is a native of Angora, the ancient Capadocia, in central Asia Minor, situated on or about the fortieth parallel north latitude, a mountainous and sterile region. His coat is a brilliant, long silky hair, dazzling white, lustrous as silk, or burnished metal, hanging down in long spiral curls, with an undergrowth of pure white down or fur. Weight of fleece four to nine pounds. The curls are regarded as evidence of the purity of the blood. Extravagant stories about the value of this fleece—five or six dollars a pound—must not be credited. It is worth more in London than any wool, bringing generally from sixty cents to a dollar a pound in gold, a little more being paid for exceptional parcels of great beauty, for fancy manufacture.

The Angora goat crosses admirably with the best common goat, "while," says the importer, I. S. DEHL, "the progeny will be as beautiful as the full-bloods. The grades by the fourth generation can not be distinguished from pure breeds, except by experts, while his meat is superior to the best mutton, and the animal himself can be fed cheaper than the sheep." A correspondent says that in this country these animals have improved in size, weight, and quality of the fleece. The three-fourths blood yield a fleece softer and finer than the imported animal, but not so long. This is more than England can boast of. France has been more successful, but not as successful as our breeders in the acclimation of this goat.

After chronicleing everything that can be said in favor of the Cashmere and Angora, we warn our readers against investing in these goats at

fancy prices, until they are sure it will pay. We have no doubt of the value of these animals to cross with our best common goats, and their introduction may be productive of as great a benefit to agriculture as the importation of Merinos; but we have had enough of the *morus multicaulis* and the "wine plant." Let there be no panic in the shawl business.

A correspondent of the *Prairie Farmer* says the Cashmere goats grade as well as thoroughbreds, are valuable additions to a flock of sheep, with which they associate on intimate terms, and the sheep soon learn to follow the lead of the goats, as these do not like exposure to storms, they run to the shelter and are followed by the sheep, much to the advantage of their health—particularly the variety that grow more in hair than wool, and cost much more than some others of much greater value. The goats also lead the flock home at night, as they will never sleep away from their accustomed resting place, if able to reach it without obstructions. The goats also fight dogs or prairie wolves with great courage, and the timid sheep soon learn to look upon their companions as their natural protectors.

"These goats are hardy; they live and fatten on coarse food. They will Winter on good straw alone, and come out in fair condition in the Spring. The common ewe goat has from two to five lambs at a birth—the Cashmere but one. They can be graded up very fast, but it is necessary to use the thorough-bred male, or as high a grade as possible, to cross with the common goat. A good common ewe goat will raise two to three one-half blood lambs well. The eight months' ewe will drop and raise one or two lambs. This is much faster than you can grade up sheep.

"In choosing common goats, get the shortest-legged, and *best-formed* you can find. There is much difference even in the *common* goats, and the form of the dam has much to do with the form of the future grade offspring. Parties desiring to grade up a flock should procure good, common ewe goats, in time to have the kids come in April or May. The kids are much stronger and harder than Merino lambs. We hardly ever lose a kid unless by unavoidable accident. A well-fatted one-half blood wether goat is superior to any venison.

"It is probable that the day is not far distant when flocks of profitable wool-bearing goats, will be seen on many of the stock farms of the United States."

HOGS—THEIR BREEDS, HABITS, AND USES.

The hog has been in disrepute for a long time, at least ever since he began to play his part in the ancient religion. It is fashionable to denounce and deride him. In one of our rural cities not long since, the story goes, a stately doctor was upset by a sow while trying to drive her and her litter out of his lawn. He retired to his office, covered with mud and mortification, and broke into the following not very flattering tirade:

"If there be anything I do most heartily detest above all the beasts of the field and fowls of the air, it is that filthy brute—the hog. He was doubtless one of the curses sent after the fall of Adam to punish us for our many sins; but our Creator, in kindness to us, afterward pronounced him *unclean*, and not only unfit to be eaten, but that he should be abhorred and driven out of the sight of all human beings. Jews, Mahomedans, and a few Pagan sects detest him; but we Christians, with a higher and purer faith, cherish him as we would a charmed serpent, even in our bosoms. Faugh! The foul, hated, unclean beast he is; and the dire author of half of the most disgusting diseases which afflict humanity! What breeds leprosy? The hog! What breeds cancer? The hog! What breeds scrofula? The hog! What originated other horrid diseases, the names of which I dare not mention? Again, I say the hog! 'Tis to this abominable quadruped we owe all our cutaneous diseases, consumption, small-pox, measles, and collateral maladies, too numerous to mention; and for this reason, an All-wise Creator, under the Mosaic law, forbade man to eat his flesh. Delicate-cured ham, pork boiled, baked or fried, roast pig, and sausages, I hate and thoroughly detest ye, one and all, as unfit to be eaten."

Yet the hog outlives all hostility, and laughs, so to speak, at the sneers of his slanderers. Still is the succulent roast pig the sacrifice on many a dinner table, and still is the ceiling festooned with the savory sausage, and the smoke-house fragrant with ham. We deal with facts; not with sentiment.

The hog is a true cosmopolite—a citizen of the world. He increases and multiplies and inherits every part of the habitable globe. He is as ubiquitous as the herring. He does not rank high as a gentleman, but is very accommodating in his habits, thriving contentedly in the sty of the rich or the kitchen of the indi-

gent. He wallows sometimes; but naturalists tell us that he does this for the sake of cleanliness—to destroy the vermin—for the same reason that Pacific islanders grease themselves. By instinct he is less filthy than many other animals, for he will not foul his bed if he can help it. Among other peculiarities, are his grunt of satisfaction, and his squeal of remonstrance and reproach—but this last is only the echo of abuse. Another trait is that he carries straw in his mouth when it is about to rain—serving as the poor man's barometer.

HOMER, in his *Odyssey*, honored the swine-keeper with the confidence of ULYSSES—and why not? The hog, called stupid, is really one of the most sagacious of animals. The gamekeeper of Sir HENRY MILDMAY actually broke a black sow to find game in the woods; to run in the hunt with wonderful success. She would track game, back and stand, and point partridges, pheasants, snipe, and rabbits as skillfully as a bred pointer. She has sometimes stood a jock snipe when all the pointers have passed it. She would promptly answer a call, and was as much excited as a dog on being shown a gun."

The Babylonian Talmud says, "Cursed be he that breedeth hogs;" and the history of the Maccabees tells us that the scribe ELEAZER walked straight to the tortures of persecution rather than eat a slice of spare-rib—heroically preferring the martyr's stake to the pork steak. This animal has been under the ban of many religions; the Easterns learned from the Egyptians to hate him because he perversely declined to "chew his cud;" but he still manages to masticate and digest considerable pottage in the course of a year.

The hog is the product of Nature's most economical thought. There is no part that can not be utilized. His flesh, fat, bristles, hair, hoofs, and bones are all turned to account. The divisions of his unctuous body are as familiar as the divisions of the earth. His ears and feet go to souse; his brains are a choice dish for the epicure. His tail has for ages been claimed by successive generations of children as their peculiar property. Tradition points out how to appropriate it—roast on the coals, take it in the fingers, and eat without salt. Spare-ribs and chine! are there any more appetizing syllables?

The hog is the staff of life—the arch enemy of famine. He is the poor man's most precious boon. Moreover, in his earliest days, he is strikingly handsome, playful, and graceful—a

rival of the human infant, for the admiration of the discerning spectator. In adult pighood he is omnivorous and self-reliant; and he breeds faster, grows faster, and keeps cheaper than any other domestic animal. So it comes to pass, that, in spite of his snout, his willfulness, his droll humor, his uncouth manners, his bristles, and his grunt, he is, and will long remain, a power in this land.

America is pre-eminently the home of the hog—he is a logical deduction from Indian corn. We read that he was introduced from Spain into the West Indies by Columbus, in 1494; into Florida by De Soto, in 1538; into Nova Scotia and New Foundland in 1553; into Canada in 1608, and into Virginia in 1609. It is related that here they multiplied so rapidly that the colonists were compelled to palisade Jamestown—high to keep out the Indians—close to keep out the hogs.

Mrs. HOG produces eight to twelve, and even more little ones at a birth; and can perform this feat twice a year. So the supply may be increased almost without limit. Some, man of figures has estimated the descendants of a single sow, with only six young at a litter, to be, in ten generations, about six million five hundred thousand. According to the census there is one hog and one additional ham for every human being in America—Indians and all. A hundred and fifty million dollars worth of hogs! In 1863, more than four million hogs were cut and packed in the West for transportation, and more than six hundred thousand of these were packed in Cincinnati.

The average weight of hogs and yield of lard, for some seasons, in the Cincinnati packing, were as follows:

Years.	Average weight.	Yield of lard.
1860	189 pounds.	30 pounds.
1861	221 "	29 "
1862	225 "	29 "
1863	263 "	26 "
1864	189 "	23 "
1865	204 "	24 "
1866	239 "	33 "

It would seem by this table, contrary to the general opinion, that the weight of the hog and the weight of the lard correspond to each other. The average prices of hogs, for fourteen years, in the market of Cincinnati, were as follows:

	Per 100 pounds.		Per 100 pounds.
1854	\$ 4 45	1861	\$ 5 97
1855	5 75	1862	3 28
1856	6 05	1863	4 45
1857	6 24	1864	7 00
1858	5 17	1865	14 62
1859	6 59	1866	11 97
1860	6 21	1867	6 85

As examples of extraordinary weight, the following aggregate and averages of several lots of hogs cut in Cincinnati, were furnished to the press in 1867:

No. of lot.	No. of hogs.	Net weight.	Average weight.
1.....	3	2,031	710
2.....	5	3,200	640
3.....	7	5,040	720
4.....	22	8,866	403
5.....	11	6,732	612
6.....	20	15,452	772
7.....	30	15,180	506
8.....	33	15,785	451
9.....	33	15,712	419

These lots, for extraordinary weight, taking quantity into account, have probably never been equalled, and the lot of twenty, raised and fed for market in Hamilton county, has certainly no parallel in the wide world, none of the hogs exceeding nineteen months in age, and generally running from fifteen to sixteen months old. The farmers of the West know that hogs are the best sacks they can send their corn to market in.

Breeds.—There are, in America, at least seven tolerably distinct breeds: Yorkshire, Chester County or Chester White, Essex, Suffolk, Berkshire, Lincolnshire, and Chinese. The Essex and Suffolk are favorites with gentlemen who feed few; but the large Berkshire Lincolnshire, or Chester County (a branch of the Bedfordshire), are preferable for the gross feeding of the West. YOUTT ("On the Hog," p. 91), vouches for a Berkshire pig, killed in Cheshire, England, in 1774, that weighed, when alive, fourteen hundred and ten pounds, when dressed, twelve hundred and fifteen pounds avoirdupois. The present breed of Berkshires has diminished in size in fifty years, but has improved in quality.

The Illinois State Agricultural Report for 1864, publishes an Essay on Swine from H. C. SMITH, of Vermilion county, from which we quote: "The improved Berkshire—that possessed of a dash of the Neapolitan and Chinese varieties—comes, perhaps, nearer the desired standard than any other pure breed, but I think it is decidedly improved by a cross of the Suffolk. The Berkshire sow is perhaps the best breeder and the best nurse known. This breed will stand more neglect and hard usage than any other; they stand long drives on foot and shipping by railroad remarkably well; they are more compact and weigh more to their looks than any other hog; their skin stands exposure to the prairie mud exceedingly well, and with reasonable care and feed a lot of them

will average one pound gain per day until they are from three to five hundred days old. But the majority of Berkshires are a little too round and close built; they have not belly enough, are too active and restless. With a little care these defects might be bred out."

The Magee hog is a variety much esteemed in some parts of Ohio and the West. A. G. NYE, of Jefferson county, Iowa, thus refers to it in the Iowa Agricultural Report for 1865: "The Magee hog was first brought to this county by Mr. DUKE GREEN about ten years ago. The hog brought to this county by Mr. GREEN was, in color, white and black spotted, with very large bone, large ears, and altogether, a very coarse hog, but of enormous size, frequently at three years old and well-fattened, weighing from seven to nine hundred pounds. They were hard to fatten, however, when young, and consequently were not popular; but, through the efforts of Mr. MAGEE, the first breeder of this hog, and others in Ohio, and Mr. JOSEPH ROBERTS, Mr. DAVID SWITZER, and others of this county who have bred the Magee hog successfully, and especially with the view of making a finer hog, we have now a hog of the same color and name, but with smaller bone, smaller ears, and altogether a much finer hog; that will fatten at any age, and, if properly managed, can be made to weigh from three to four hundred pounds at from fifteen to twenty months old; and this is the best age to market hogs for Iowa farmers, and I think the Magee hog the best for our purpose. Other breeds may suit better for some regions—such as a dairy region, where hogs must be marketed at from six to ten months old; but for any corn-growing region, like southern Iowa, the Magee hog is superior to any that I have seen."

Points and Management of a Breeding Sow.—She should be large for the breed, square built, with short nose, ears and legs, thick and rather short in the neck, plump and compact in the carcass, broad in the breast, substance in the fore-arm, and a hereditary tendency to fatten well and early. Never let her raise pigs until she is a year old, and never but one litter the first year. Then if she proves a good milker let her raise two litters per year.

It is about as important that a sow should come of a family of good milkers, as it is for a cow. S. LEWIS says in the *Michigan Farmer*: "I find that hasty pudding and milk for the

supper and breakfast, and corn for dinner, constitute a very good diet for a breeding sow. A great many farmers have fallen into an error in not allowing plenty of straw for a bed. Many build a warm pen in order to avoid giving her much straw. Let her run to a straw stack and she will "build" a nest to suit herself." Let her food be moderately salted, and feed charcoal, and a trifle of sulphur occasionally. Every hog should have a little charcoal occasionally.

During the first week in the age of the pigs, the mother should be disturbed as little as possible. Especially strangers should not approach her. Give her nothing to eat for two or three days, except a little thin warm gruel, not exceeding half a pint of meal a day. Give her a pail or two of warm water each day. If she is doing well and is quiet, and takes care of her young, "let well enough alone." After three days time you can feed more, and when the pigs begin to come to the trough and eat, you will have ample space to dispose of all the spare meal and buttermilk your place will afford. Young pigs will fatten faster on pure skim-milk than anything else.

The plan or custom of *breeding in and in* from close relations is a most injudicious course, and seems to bring on degeneracy in the offspring. In selecting both sows and boars, a due regard must be paid to the object for which the progeny are designed. Small bone is desirable in stock reserved for breeding, as this description produces the least offal.

How many Pounds of Pork will a Bushel of Corn Make?

This question, much discussed, can never be answered, because it depends on different conditions—on the breed of hog, on the kind of corn, and still more on the temperature of the pen. The last consideration is too important to be overlooked.

We have already set forth the unprofitableness of leaving neat cattle exposed to cold, and keeping them warm with expensive food instead of with snug quarters. Swine are subject to the same conditions. A correspondent of the *Ohio Farmer*, writing from Duncan's Falls, gives an account of an experiment made with one hundred hogs, averaging two hundred pounds each, and placed in nine large covered pens, with plank floors and troughs. The result is detailed as follows:

"The corn was ground up, cob and all, in one of the 'Little Giant' steam mills; steamed and fed at 6 and 9 A. M., 12 M., 3 and 6 P. M.,

or five times a day, all they could eat, and in exactly one week they were weighed again, the corn they had eaten having been weighed also, and calling seventy pounds a bushel, and pork as before—four cents gross—it was equal to eighty cents per bushel for corn. The weather was quite warm here for the season of the year. The first week in November I tried the same experiment on the same lot of hogs, and the corn only brought sixty-two cents per bushel, the weather being colder. The third week, same month, with same lot of hogs, corn brought forty cents, and the weather still getting colder. The fourth week same as above, corn brought twenty-six cents; weather still colder."

This lot of hogs were sold off the last of November, and another lot of hogs put up, which had been fed in the field on corn in the cob.

"This lot was weighed and fed as above, the five weeks of December, and the corn fed averaged twenty-six cents a bushel, the weather being about the same as the last. This lot was tried again in the middle of January, the corn fed for that week averaging only five cents per bushel; at that time the thermometer stood at zero. This same lot was tried again and just held their own, the thermometer being below zero, sometimes as low as ten degrees."

From these facts the writer comes to the conclusion that "it will not pay, as a general thing, to feed corn to hogs after the middle of November," unless the price is very low. The experimenter is certainly correct in deciding that it will not generally pay to use corn for fuel to keep hogs warm in Winter; but the conclusion that it will not pay to feed corn at all in Winter seems not necessarily to follow. Let him keep them warm with a thorough shelter, and his corn will make pork as rapidly as in Summer.

Experiments.—If the farmer can get as much for his corn by first making it into pork, as by a sale of the grain itself, it is best to convert it to flesh, provided the manure is worth more for his land, than the labor of feeding. *Hunt's Merchant's Magazine* gives several experiments, showing the cost of pork making. In one, 100 hogs were fed 100 days, by S. B. ANDREW, of Ohio, with as much corn as they could eat, and each bushel of corn gave an increase of 10½ pounds of animal, or 8 2-5 pounds of dressed pork; or, in other words, 1 pound of pork required 5½ pounds of corn. In another experiment with 58 hogs, 1 pound of pork required 6½ pounds of corn. The corn was fed in the ear.

According to these experiments, three cents per pound for pork is the same as twenty-five cents per bushel for corn; four cents per pound is thirty-three cents for corn; five cents per pound is forty-two cents per bushel; and six cents per pound is fifty cents for corn. This would not pay in many places, without fattening hogs mainly on apples, which many farmers do at a great profit.

A smaller experiment made with *cooked meal*, by Hon. H. L. ELLSWORTH, required a little less than four pounds for a pound of pork. Different breeds might give quite different results.

According to another experiment, six hogs were shut up to fatten the first day of Autumn; they were fed one month on 29 bushels of corn, (58 bushels—ears), and increased 386 pounds, or $12\frac{2}{3}$ pounds gross weight, for each bushel of corn. The next month they were fed 68 bushels, and gained 336 pounds, or 10 pounds per bushel. The last month they consumed 56 bushels and increased 272 pounds, or nearly 10 pounds per bushel. This result was quite similar to the first-mentioned above, and this may be taken as about the average results of judicious feeding in the ear in the early Autumn.

Another experimenter, J. D. LAWES, obtained one hundred pounds of pork from seven bushels of corn, or one pound of pork from four and a half pounds of corn; the grain was ground and moistened with water before feeding. NATHAN G. MORGAN, of Union Springs, by wetting his meal with five times its weight of hot water, and letting it stand twelve to eighteen hours before feeding, obtained one pound of pork from two and a half pounds of corn.

A Kentucky farmer reports through the *Ohio Cultivator*, that a bushel of dry corn fed to hogs made five pounds of pork; a bushel of ground corn boiled, in one instance, made sixteen pounds and seven ounces, and in another nearly eighteen pounds of pork.

A correspondent of the *Prairie Farmer*, says with reference to the quantity of pork from a bushel of corn, that a series of carefully conducted experiments have established the following facts: A bushel of good, raw, unground dry corn, fed to a middling good breed, in comfortable quarters, without much sun, and not allowed to root, and before cold weather, will produce ten pounds of pork, and if the breed is very good, fifteen. The same amount of fermented corn meal will produce one-half more; and, if cooked also, about three-fourths

more than in its raw state, hence it is easy to find how much pork should bring to correspond with the price of corn. Take, for instance, raw corn, the most common way it is fed; pork at five cents per pound is equal to corn at fifty cents per bushel, and so on, above or below, in the same ratio. The good of our farms and pockets demand that we sell our oats and corn in beef, mutton, pork, butter, cheese and wool.

The Utica New York, *Herald*, an excellent authority, says: "Upon an average of several careful experiments, two bushels of corn in the ear, or one of shelled corn, make nine and seven-twelfths pounds of pork. The same amount of corn ground into meal, and mixed with water, produces eleven and one-eighth pounds of pork."

The New York *Independent* says, from carefully conducted experiments by different persons, it has been ascertained that one bushel of corn will make a little over ten and a half pounds of pork, gross. Taking the result as a basis, the following deductions are made:

When corn sells for $12\frac{1}{2}$ cents per bushel, pork costs $1\frac{1}{2}$ cents per pound.

When corn costs 17 cents per bushel, pork costs 2 cents per pound.

When corn costs 25 cents per bushel, pork costs 3 cents per pound.

When corn costs 36 cents per bushel, pork costs 4 cents per pound.

When corn costs 50 cents per bushel, pork costs 5 cents per pound.

The manure will more than pay for the labor of feeding and killing the hogs.

Cooked Food for Hogs.—A Wayne county, Pennsylvania, farmer has accurately tested the results of cooking feed for swine, and presents the following figures:

The experiment was conducted with two pens of hogs, which were carefully weighed, the gains noted, and the food in each case also weighed or measured. The hogs selected for the experiment were all grade Chesters, and, with one exception, nearly of the same age, weight, condition, etc. Pen No. 1 contained three hogs, whose live weight was nearly one thousand pounds. They were fed all the corn they would eat up clean—the three consuming forty-five pounds of corn daily. After being fed seven days, they were again weighed, when it was found they had gained ten pounds each. By calculation we find that during the seven days this pen of hogs consumed five bushels and eight quarts of corn, costing \$6 66. The

gain being thirty pounds, we see that thirty pounds of pork cost \$6 66, and would have sold at the time for \$2 55. Pen No. 2 contained two hogs, one of which weighed alive six hundred pounds, and the other nearly four hundred pounds. They were fed all the cooked meal they would eat—the two consuming twenty-five pounds of meal per day. The respective gains of each were five and seven pounds, the smaller hog gaining five pounds per day and the larger seven pounds. By calculation we find that the pork made from whole corn cost a trifle over twenty-two cents per pound, while that made from cooked meal cost four and a half cents per pound.

THOMAS J. EDGE, of Chester county, Pennsylvania—one of the best farmers of that excellent farming district—in answer to the inquiries of the editor of the *Practical Farmer*, gives that paper a report of his experiments, which can not fail to be read with interest by all engaged in making pork:

"My first experiment was with old corn, in three forms, viz.: shelled and fed whole; ground and made into slop with cold water; and ground and thoroughly cooked. The pigs, five in number, were from the same litter, and were the produce of a good common sow crossed with a Berkshire boar.

"In each case the food was given them as fast as consumed, and all possible care taken to avoid any waste or irregularity of feeding; in every case of a change of food three days was allowed before the weighing for the experiment, in order that the effect of a sudden and entire change of diet might not affect the result.

"I found that five bushels of whole corn made 47½ pounds of pork. Five bushels (less miller's toll) of corn, ground and made into thick slop, with cold water, made 54½ pounds of pork. The same amount of meal, well boiled and fed cold, made 83½ pounds of pork.

"With the whole corn the pigs had the slops from the kitchen (no milk), and for drink with the boiled mush, one or two quarts were thinned with cold water, or slop from the house; in each case the house slop was used in some form or other, but all the milk was reserved for small pigs. The fifteen bushels of corn cost \$1 30 per bushel; and thee will notice, that while the pork made from the whole corn barely paid for the corn, that from the same amount of ground corn cooked, paid the whole cost of the corn and a little more than one dollar per bushel over, and that the economy of

grinding and making into slop will fully warrant the extra trouble and expense. How could it be otherwise, when the whole economy of profitable feeding consists in bursting or breaking the indigestible hull which encloses the minute particles of the food?

"In the above experiment the data are based upon pork at \$14 per cwt., and corn at \$1 30 per bushel; but it will apply as well to other prices.

"The second experiment was exclusively with new corn, in two forms, viz.: on the ear, and shelled and ground before boiling; and all in each case was what we know as 'nubbins' or soft corn. The best of this class of corn was reserved for the pigs and the worst fed to the cattle. Ten bushels on the cob made 29½ pounds of pork, fed in the usual way, on the ground. The same amount shelled, ground by horse-power, and well boiled, made sixty-four pounds of pork. Of course, a portion of that fed on the ear was wasted; but it is the common plan, and forms but a fair test of the comparative merits of cooked food. I have made no experiment with sound new corn, but may have a favorable opportunity before the season is past; but would suppose that my experiment with old corn would form a good criterion to judge by.

"Thee asks for any indirect points which may have been noticed during the experiments. I have found that there is economy in allowing the food to become thoroughly cold before it is fed; that in this state a larger amount will be eaten, with more apparent good appetite; that, while scalding is beneficial, thorough and prolonged cooking under pressure is more economical. In more than one case I fastened the lids of the barrels down until the pressure was as high as five pounds per square inch in the barrel and steamer, and an examination into the condition of the food convinced me that its globules were thoroughly bursted, and it was all, or nearly all, rendered available. During a given time the same pigs will consume rather more corn cooked than uncooked.

"Having eaten various portions of one of the above pigs fed almost entirely on cooked food (fed cold), and having assisted in killing all of them, I must say that the prevalent idea that the meat of such pigs is not as firm as if fed upon uncooked food, has proven, in my case, to be erroneous—though I am not prepared to say what the result would have been had the food been used while warm or hot."

Another correspondent of the same paper,

in speaking of the value of potatoes when cooked for hogs, says :

"I have demonstrated to my own satisfaction, with the use of a Prindle steamer and careful weighing, that while five bushels of boiled mush (hasty pudding) will make eighty-four pounds of pork, three bushels of meal and five of potatoes will make seventy-two and one-half pounds of pork. I do not wish to be understood that the five bushels of potatoes made the extra twenty-two and one-half pounds, but merely to state that under similar circumstances the *two combined* produced the above result."

A correspondent of the *Indiana Farmer* thus narrates his experience: "My piggery is one hundred feet long, with a cook room attached to one end in which is situated a tubular boiler for generating steam. Extending through the center is an alley way six feet wide; on each side are the pens, eight feet wide by seven deep, from which there is a door leading to the outside yards, which are of the same size. There are sixteen pens of the size I have described, in each of which are six hogs. My mode of cooking is with two large tanks, each of which holds four hundred gallons; steam is carried into these tanks by iron pipes direct from the boiler, and valves are so arranged as to boil one or both tanks at once. Into these tanks is pumped about one hundred gallons of water, which is boiled in about twenty minutes by opening the steam valves; the tank is then filled up with garbage from the city (which, by the way, contains everything used in the kitchen for cooking), and closed up tight; steam is kept up for one hour. By this time every particle of this matter is thoroughly cooked. The tanks are then opened, and if near the time of slaughtering, a bushel of corn meal well mixed in, the steam shut off, closed up and allowed to stand until the following day to cool before feeding, when it is at just the right temperature to make the most fat. One of these tanks will give my hogs a good feed; the other is ready for evening. I am fully convinced that hogs can be kept and fattened at one-third less expense by cooked food than by raw; in fact my experience satisfies me that cooked food is indispensable, especially during the Winter months, and I would recommend steam as the most effectual and economical. I am sure that farmers who keep from six to twenty-five hogs would find a steam apparatus a good investment."

At a recent meeting of a Farmers' Club, the

breeding and feeding of pigs being under consideration, the leading speaker submitted the following suggestions: "You will require dry floors, fresh air, and cleanliness. Foul air encourages disease; cold air consumes food in making heat, that ought to make fat. It would not be practicable to put in a growing store to take fat, nor would it be judicious to put in a coarse dwarf to make a good bacon hog. You must have a full-grown, fair-conditioned animal. There should not be more than six kept in one sty. The farmer has five principal ingredients for this purpose, viz.: Grain, potatoes, Swedes, mangel wurzel, and cabbage. The roots well-boiled and well-bruised, the grain also well-boiled—take equal parts of Indian and oat meal, and any of the grains mentioned you may have, as crushed beans, peas, vetches, rye, or barley, with a little pollard and salt, made in thick gruel, added to the roots, and always given in a lukewarm state at regular hours three times a day. The less excitement or annoyance the better, and a desire for sloth and sleep encouraged by watching his comforts, and the words made applicable that are sometimes used with some easy-going and quiet dispositions:

"To eat and drink and sleep; what then?
To eat and drink and sleep again."

Brief Hints for Feeding.—Most farmers will say: "Go to grass with your small-talk about hogs; haint I raised 'em these forty year?" Hold on, friend!—let us offer a few suggestions for those who are not so wise as you.

A hog's unique in character; he will sleep himself into fat, but nobody ever knew one to squeal himself into fat. His Winter bed should be as dry and warm as his owner's. He should have some square yards of fresh earth, for he never feels quite happy unless he spend a portion of his time in rooting. In Summer give him a faithful washing once in twenty days. The growth will richly repay the labor expended.

Mr. LAWES, of England, a gentleman of large leisure, fortune, and experience, made three series of experiments in pig feeding, a few years ago, that are entitled to much consideration. In both the first and second series, thirty-six pigs, from nine to ten months old, and weighing about one hundred and forty pounds each, were divided equally into twelve pens, weighed once a fortnight for eight weeks, and fed with different food. Bran, beans, or peas, corn, barley, and

boiled codfish were used separately and together, both in limited and unlimited quantities, and the gains of each carefully noted. The result was that bran was found a very poor food, that a variety of food was found more fattening and profitable than any one kind alone, that Indian meal was found the most fattening in proportion to its weight, that barley meal, fed without limit, produced more flesh than Indian meal, that five hundred and sixty-five pounds of barley meal and four hundred and ninety-one pounds of Indian meal were equivalent in increasing the weight of the animals one hundred pounds, and that as animals fatten, they consume less food, and increase less. A bushel of corn made no more pork on a fat hog than a lean one. The lean hogs eat more and grow more, the fat ones eat less and grow less.

It has been often proved by actual experiment, that corn when ground and cooked, is thirty per cent. more economical for fattening pork than when fed in the usual way.

Mr. KENDALL says in the *American Stock Journal*: "A good many intelligent farmers in the States of New York and Vermont are beginning to fall into the Canadian pea practice—feeding stock on peas and vines, and fattening pork on peas—finding a saving of thirty to fifty per cent. in doing so, besides a quick and easy method of maintaining a maximum condition of fertility in their land, without expending half their income for expensive mercantile fertilizers."

A correspondent of the Richmond, Virginia, *Farmer*, also testifies: "My honest opinion is, that two bushels of peas are far superior to three bushels of corn, and worth more to fatten hogs, or to increase the milk of cows."

Sugar beets and parsnips are regarded as among the best food for hogs. Parsnips are preferred, but they should be fed raw, as boiling makes the pork flabby. Parsnips appear to be nearly the only root good for swine in an uncooked state. Turn a herd of swine into a field containing field beets, ruta bagas, carrots, and parsnips, and the question will very soon be settled which they like best, and which, consequently, is best for them—the parsnips being wholly devoured before the others are touched.

Boiled turnips mashed with coarse shorts and salted, make a very effective dish. Also boiled potatoes and boiled pumpkins—though the seeds should first be removed from the latter. A correspondent of the *Ohio Farmer* insists

that sorghum, thrown to the pigs whole, is equal to Indian corn, and presents some facts corroborative.

Why Sows Destroy their Young.

A writer in the *American Stock Journal* thinks that costiveness and its accompanying evils are the main causes of sows destroying their young, and proper food the preventive and cure. He says he has "never known a sow to eat her pigs in Autumn, when running at large with plenty of green food; but, with hardly any exception, sows littering early in the Spring are troubled with costiveness, which is frequently so severe as to be accompanied with inflamed eyes, and followed by frenzy." Potatoes, turnips, beets, carrots, or parsnips, or any vegetable that will have a tendency to open the bowels, are recommended.

Feeding Standing Corn.—In some portions of the West, farmers let their fattening swine harvest the corn, turning them into the ripening field in early Autumn—say August or September—restraining them to one part of the field at a time by a movable fence, which encloses about enough to last them for two or three days. Corn can sometimes be fed advantageously in this manner, where the stock is large and the price of labor high.

But there is no reasonable doubt that corn is generally fed most economically by grinding and steaming, especially when it is done on a large scale—the grinding and steaming being both performed with one engine, at the farmer's own barn.

To Prevent Swine from Rooting.

—Shave off with a razor, or sharp knife, the gristle on the top of the noses or snouts of young pigs. The place soon heals over, and the pigs are thus rendered incapable of rooting.

Spaying Sows.—A correspondent, who has "successfully tried it," recommends the following method of spaying sows, as "much less painful than when done with a knife: "Inject with a small syringe, up the uterus, about a wine-glassful of sulphuric acid. This destroys, on the part of the sow, all desire to take the boar."

Diseases of Swine.—We shall refer briefly to the most prevalent of these, and give approved methods of treatment. During the last ten or fifteen years, the swine of most of

the States west of the Alleghanies have been seriously afflicted with a disease, or combination of diseases, commonly called

Hog Cholera.—It appeared in Indiana in 1856, and soon attacked the adjacent States. It spread through the West and South, in nearly every State assuming, at some period, the character of a wide-spread and fatal epidemic. Its victims have been numbered by millions. It prevails somewhat in Pennsylvania, New York, and a little in New England, though generally, in swine brought from the West.

According to the United States Agricultural Report for 1866, in some of the counties of Virginia, three-fourths of the hogs died; in the Carolinas and Louisiana, almost as many; in Georgia, hog raising was abandoned on account of the disease; in Alabama, a man with a herd of one hundred and seventy-four, lost all but eighteen; in Union county, Tennessee, seven hundred died; in Kenton county, Kentucky, from four to five thousand—the loss ranging from three to forty-five per cent. throughout the State; in some counties in Illinois and Missouri, the loss is given at fifty per cent., and, in Indiana, a fifth of all the hogs produced for five years are said to have perished by this insidious disease.

Hog cholera is a general disease of the whole system, resulting from some poisoning of the blood; and the pleurisy, the inflammation of the lungs, the ulceration of the intestines, the superficial ulcers and swellings, and other ailments are only the local effects or results of the general disease.

The symptoms are a refusal of food; an intense thirst; difficult breathing; the animal staggers and falls; in most cases there is diarrhea, with copious fluid discharges of offensive matter; in some cases there is vomiting; the legs are swelled; purple spots appear first on the nose and head, and, as these multiply and become ulcers, the animal dies. From investigations by Doctors GEORGE SUTTON, of Indiana, and G. L. COLLINS, of Rhode Island, the disease would seem to be a sort of pleuro-pneumonia.

Dr. EDWIN M. SNOW,* of Rhode Island, denies that the disease is contagious, as it is thought to be by Dr. SUTTON, and adds: "The following, as I understand the subject, are the causes, not only of this disease among swine, but also of the disease referred to among cattle, as well as of epidemics in the human race, viz.:

"1. An epidemic atmospherical poison.

"3. The local conditions or circumstances adapted to receive and propagate the poison existing in the atmosphere."

Of these causes, says Dr. SNOW, very little else is known; we do not know what are the chemical or electrical changes in the air by which the poisons are generated, nor very much about the local conditions adapted to their propagation. Of this last, however, we know that some of the conditions favorable to the spread of the disease are low ground; impure air arising from filthy pens; overcrowding; the use of improper and unwholesome food; and the want of pure water. The mention of these stimulants of the disease, suggests the preventive conditions,—and every farmer should remember that the disease is malignant, and in prevention is the only safety.

Treatment: Remove to a clean, dry pen; stimulants and tonics of some description, with plenty of pure air, pure water, and suitable nourishment must be given. A correspondent of the *Prairie Farmer* says; "I have resided in Illinois one year, and I have had sixty head of hogs on hand during that time. They have had the cholera, but I have not lost one from it. I feed three parts wood-ashes, two parts salt, one and a half parts copperas, one and a half parts sulphur, pulverized. Mix all with wheat bran. I feed once a week. Do not feed musty corn, and your hogs will not be so apt to take the cholera."

The *Western Rural* states that hog cholera is caused by eating more than the animal can well digest, and salt and charcoal or stone coal are recommended as proper remedies and preventives to be kept at all times within reach of the swine. This theory and treatment are now generally adopted throughout the West, with quite uniform success.

Kidney Worms.—Hickory ashes in the food, or corn soaked in very strong lye, are said to be infallible remedies for kidney worms. Salt, brimstone, and charcoal fed occasionally, seem to be a preventive. A correspondent of the *Cultivator*, says: "I have often known copperas given to hogs with this disease, and never knew it fail to cure them in a few days, even after the hog was unable to get about by dragging the hind legs. The copperas may be given to them in portions of about half a spoonful daily, in dough, or anything else that they will eat."

Mange.—Chamber lye is a certain cure for the mange; pour it on the hog, and rub well with the hands at the time. If a very bad case

* Essay in U. S. Agricultural Report for 1861.

give a good dose of red-pepper tea; afterward sulphur, a common dose. Feed warm dish-water and oat-meal mush. Antimony with sulphur and hog's lard is YOUATT'S mange-ointment.

Measles.—This is a disease resulting generally from confinement. Keep the sties clean, and give a half tea-spoonful of powdered antimony. If they are affected with sore throat turn them into an open pasture where there is fresh feed and ground to root. Pounded charcoal mixed with their food is good where pasture can not be had.

Staggers.—The *Western Farmer* says: "For staggers in swine we would recommend cutting a notch in the roof of the mouth till the animal bleeds freely, then rubbing it with salt, giving

it a little urine to drink. Pigs have openings on the inside of the fore legs below the knee from which, when in health, a small discharge is kept up. The stoppage of these little orifices is supposed to be the origin of the staggers, and rubbing them with a corn cob, or other rough material, will usually effect a cure." Another authority applies the same remedy by introducing the salt in a slit cut in the forehead—the head being first fastened with a rope noosed around the upper jaw.

Thumps.—One table-spoonful of copperas at a feed to every ten shoats, given three or four times a week, will both prevent and cure this disease. The copperas should be dissolved in a small quantity of warm water and then mixed with the slop or feed.

POULTRY, BEES, AND FISH CULTURE.

METHODS OF MANAGEMENT AND CONDITIONS OF SUCCESS.

Poultry.—Poultry and eggs are held in higher estimation by the French than by any other people. According to a national statistician, the French eat more than seven thousand million eggs a year, which is something like one hundred and fifty eggs annually for each man, woman, and child! England consumes seventy-five thousand tons of eggs a year! The *New York Evening Post* estimated the value of poultry and eggs in the United States, in 1861, at the enormous sum of two hundred and sixty-five millions of dollars—more than half of which represented eggs. The recent shipment of eggs from a single county in Ohio, eastward, in one month, was officially reported to be one hundred and fifteen thousand two hundred dozen, and one merchant in Marion county shipped one thousand seven hundred barrels in a season. The eggs eaten in this country every year, blown and strung, would form a necklace that would encircle the earth five times!

The Ovarium.—It has been ascertained that the ovarium of a fowl is composed of 600 ovulas or eggs, therefore a hen during the whole of her life can not possibly lay more eggs than 600, which in a natural course are distributed over nine years in the following proportion—varied in some breeds:

First year after birth.....	15 to 20
Second " "	100 to 120
Third " "	120 to 135
Fourth " "	140 to 115
Fifth " "	10 to 80
Sixth " "	50 to 10
Seventh " "	35 to 40
Eighth " "	15 to 20
Ninth " "	1 to 10

It follows that it would not be profitable to

keep hens after their fourth year, as their produce would not pay for their keep, except when they are of a valuable or scarce breed.

Varieties.*—The common dunghill fowls of this country are in great excess of numbers over the distinct breeds which have been introduced from abroad. Some of our native mongrels are excellent fowls and worthy of retention; but as a rule they are inferior to the best imported breeds, and their owners ought to supersede them or seek to ameliorate their quality by crossing them immediately with some pure-blood.

That the mixing of this foreign blood with that of our own native races of domestic birds has already proved of great advantage, no one who has bred poultry extensively in the last fifteen or twenty years will deny; and whether we consider the item of increase in *size and weight*, at a given age, attainable with certainty through this crossing of stronger foreign blood upon our native breeds, or that of the well-decided advantage thus obtained in the enlargement and increase of weight and numbers of eggs obtained from the product of this crossing, the general gain by the process is clearly in our favor.

Shanghai.—We begin with this disagreeable and abominable bird, because he is the largest of the genus *gallus*, and we can not omit him, because with some demoralized breeders he is still a favorite. A farmer writes from Fond du Lac that "the Shanghai is the *sumum bonum* in the chicken line. If he means *some bone*, he is

*The best popular representation of the different varieties of fowls known in America, is a gorgeous chromo-lithograph by L. PRANK & CO., of Boston. The portraits of the breeds are very accurate, and the sheet makes a handsome picture for the dining room.

quite correct. Look at the ungainly gawky!
"Behold him in all his glory!"



Says the sarcastic artist: "Here he is in his naked deformity! neck like the leaning tower of Pisa; ruff like a Connecticut umbrella; tongue like a weaver's shuttle; feathers rallying here and there, in a vain attempt at wings and tail; legs like two California pines—convenient for stepping over stake-and-rider fences; spurs like an old-fashioned well-sweep; feet a reproduction of the pedal extremities of some antediluvian monster!" The *Wisconsin Farmer* exclaims: "We don't see any particular advantage in breeding our hens to eat on the top of a barrel, and mere size is not to be sought at the expense of quality. The pure Shanghai is coarse in flesh, an immense consumer, a small layer, and a miserably clumsy, though very willing sitter. In a state of purity they are perfect abominations, eating about as much as a Chester county hog, while any child can count their eggs. For our part, we would as soon have a drove of swine or of mules

wading through our crops or hanging around our doors as a flock of such burlesques."

Brahmas and Cochins.—These, as their names imply, are Asiatics and cousins of the Shanghai, though they are so improved, that the relationship is suggested only by the large size. "These fowls," says C. N. BEMENT, one of our best poultry authorities, "are noted for being early and abundant layers. Eggs of good quality, averaging about two ounces each—rather small in proportion to the size of the breed—good mothers; chickens strong, grow rapidly with good feeding, fit for the table at four months old. As has often been said, they are early and excellent layers, and arrive at maturity earlier than any other large breed. By the term 'maturity' is meant the age at which a pullet will commence laying, and thus perpetuate its race."

As Winter layers they excel all other fowls; and they are so hardy that they can be hatched and reared in almost any weather. Frost does not seem to affect the eggs. The *Scottish Farmer* says: "If any one wishes a nice looking, useful hen, we have seen nothing that we can recommend so well as a cross between a Brahma cock and a common barn-door fowl." Both the Cochins and Brahmas bear confinement to a limited space better than most fowls—a four-foot fence will hold them. They are, however, large feeders, and have rather coarse-grained, oily flesh.

Where a supply of new-laid eggs is required in Winter, irrespective of temperature, Cochins, buff, white, or partridge—or Brahmas are the most to be depended on, as when they have attained an age of seven or eight months, the pullets of these breeds lay quite irrespective of season, of course supposing they are well fed.

A fancier of these large fowls says: "The Brahma fowls are the best the hen fever ever introduced into this country, for laying in all seasons of the year. Taking all things together, we believe they will meet the most common wants, satisfy the most common requirements, and adapt themselves to the most common circumstances of those who desire to raise fowls for amusement, for eggs, or for market."

Dorking.—For chickens for the table, there is nothing like the Dorkings. The varieties are, white, gray, silver gray, and speckled, and they are preferred for the table in the order named. They are handsome; are moderate layers of large and well-flavored eggs; restive not calculated for confinement; sit steady and are excel

lent mothers, rather delicate in constitution, chickens not easy to rear. They are to be ranked among the large fowls, and are esteemed the best in quality of flesh.

The Horticulturist says: "The Dorking has for years had our preference as a bird for all purposes of laying, breeding, etc., and all published works agree with us. All who experiment carefully, and weigh well the subject, we believe, will join us in saying, that for one breed alone, the pure Dorking has the most good qualities. A cross of a Dorking cock with Brahma hens, gives, perhaps, the largest and best chickens for early eating; but if the breeds are not kept pure—in other words, if the first cross be bred from, the succession will be unworthy the attention of any breeder, and therefore we find it best to confine ourselves to the Dorking alone."

It has a large, plump, square body, with a remarkably full breast; short, stout, white legs and skin, and usually five toes upon each foot. There are both white and colored birds, the colored generally being considered the more hardy and a little the heavier. Their weight is from five to eight, and sometimes nine pounds. Dorkings feather early, mature young, fatten easily, have a white, fine-grained and tender flesh, which is excelled in flavor only by the game fowl.

Hamburg.—For number of eggs, there is nothing like the Hamburgs, but they never sit if they can help it. They are distinguished as "everlasting layers," of middling-sized, but rich eggs, and like all great layers, they are poor incubators. They lay eleven months in the year, but seem to think that an egg has no possible destiny except to be eaten. They are very handsome birds; bear confinement tolerably well; are highly attractive on lawns. There are five principal subvarieties, the black, golden-spangled, silver-spangled, golden-penciled, and silver-penciled (Bolton Grays). Hamburgs generally have rose combs and blue legs, except the black; the cock will weigh from three to four pounds, and the hen from three to three and a half pounds; flesh not first-rate for the table. They are considered small eaters, and are great favorites of those who require an abundance of eggs rather than frequent broods of chickens.

Polands.—This breed seems to be allied to the Hamburg. The varieties are white, black with white top-knot, and golden and silver-spangled. They are remarkably handsome birds; great layers, but poor sitters; unfit for confinement;

not good for the table; chickens are rather delicate, and difficult to rear. The Polands all have combs alike—a small comb in front of top with two points. Yellow-legged Polands are said to be hardier, and excellent for the table. Poland hens have been known to lay two hundred to two hundred and fifty eggs a year.

The London Field, speaking of the Hamburg and the Polands, says: "If the mere weight and number of eggs is taken into consideration, we believe that no fowls will give so good a return for their food as gold and silver-spangled. The pullets of these breeds will, if well fed, and with a free range, commence laying at about six months of age, and will continue to lay ten or eleven eggs a fortnight until next moulting season. After the second season they still lay admirably, but not quite so freely. We are certain that no fowls will give so many eggs for their food as these beautiful birds; and for choice as layers, we would select the silvers. There is no doubt that five pullets of this breed may be depended on for supplying over one thousand eggs in twelve months. But they have their drawbacks—they are innocent of all knowledge of bounds, and fly like wild fowl, as might be inferred from their laying propensities, do not sit, and their eggs are slightly below the average size of those of the larger fowls."

Black Spanish.—For size of egg there is nothing equal to the Spanish; but they are capricious layers. They are very handsome birds—the aristocracy of poultry. Lay larger eggs than any other breed, and in great numbers; poor table fowls; thrive in any locality, however confined; do not sit; their color suited for any atmosphere. They are notorious for laying eggs that weigh from two and a half to three ounces each. They require warm housing and good care. As a rule, they yield fewer eggs than the Spangles, and mature a little later; but if eggs of large size are required, and the fowls have to be kept in or near large towns, none answer better than Spanish.

Bantams.—Useful to those who are fond of birds, and are deterred from keeping them by lack of accommodation; to those who have only a very limited space at command, the different varieties of Bantams will prove satisfactory. The principal kinds are golden and silver-laced Sebrights, game, black and white, and Japanese. They are excellent for Winter laying.

Game.—The Game fowls are good layers of rather undersized, delicious eggs; first class sitters and mothers; flesh fine-grained and second to none for the table. They are hardy and

great foragers, and can not bear restraint. They are excellent fowls in all respects except their pugnacity, and by some are preferred to all other breeds.

Leghorn.—J. C. COX, of Osborne, Ohio, says: "My experience is that the Leghorn fowl has no superior whatever—a new variety called Sicilian, I think, nearly equals in number and size of eggs, either Brahmas or Spanish. The Leghorn will lay two-fifths more than Brahmas, and one-third more than Spanish. Another farmer thinks that "the best fowl for general and all purposes combined, is a cross of the yellow-legged white Leghorn and Brahma, using a cock of the former with hens of the latter. The result will be a medium-sized fowl, pure white, yellow legs; superior layers; not all sitting, nor total abstinence from incubation; excellent meat and flesh; no real objections in any respect."

French.—The prominent French breeds, the Crevecœur, La Fleche and Houdan, are little known in this country, but the first-named has a European reputation of standing at the head of all breeds as a table fowl. Their eggs are also very large; and the fowl ranks among the heaviest, as well as the choicest. A writer says: "The Crevecœur has a very bulky appearance, and is strongly developed; crest, whiskers, and beard in both hens and cocks. The comb of the cock is very prominent and projects like two horns; with the hen it is the same, but much smaller. The whole plumage is perfectly black, legs black, claws four in number, strong and long. This breed is superior in all respects, and justly esteemed as the most precocious and finest in the world. There is nothing that equals them as a table fowl. The chickens are in fine table condition at three months. Last year I myself had chickens of this breed, that at six months weighed seven and three-quarter pounds. Eggs very much resemble the Spanish, being fully as large."

Dominique.—This is the best fowl of common stock that we have, and is the only common fowl in the country that has enough distinct characteristics to entitle it to a name. These fowls are full medium in size, being but little less in weight than the Dorking, have full breasts, roundish plump bodies, double or single combs, and yellow legs. Their main plumage has a light gray ground color, while each feather is barred crosswise with a darker shade. They are frequently known by the name of "hawk-colored fowls." They are good sitters and mothers, are hardy, easily raised, retain their

peculiarities with great tenacity, have yellow skins, a color preferred by many for a market fowl; and taking these fowls all in all, they are one of the best varieties for common use.

Hon. JOHN WENTWORTH and Col. HOWLAND, President and Vice-President of the Northwestern Poultry Association, have each expressed very high opinions of this fowl, the former, we believe, breeding them almost exclusively, at least giving them the preference over all other breeds. At a late exhibition of this association, the Dominique certainly compared very favorably with any other variety shown.

Interbreeding.—Many object to crossing the pure breeds of the so-called ornamental fowls, lest the new strain result in degeneracy; but it is not evident why special qualities may not be bred in, and why the whole law of selection will not apply to this, as well as to any other department. It is believed, on the contrary, that there is every opportunity in this country for those who keep poultry to gain whatever shape, size, or characteristic they fancy, by carefully breeding to combine and perpetuate the superior points of different breeds. See what breeding *has* done; it is thought by naturalists that the eggs of our domestic hens are, on an average, a third larger and heavier than those dropped by the hens of the ancients—and analogy would indicate that the hens themselves are also larger than their feathered progenitors. Some of the best poultry-men in this country are advocates of careful and persevering experiments to improve on the present "pure breeds."

Concerning Eggs.—Eggs, even from the same hen, sometimes differ a good deal in weight, but retain their general characteristics, so that the observing housewife can soon learn to pick out those laid by each fowl.

Barley is said to increase the proportion of the yolk of the egg, and rye is said to favor the development of the white.

Loss in Weight.—Eggs lose a slight portion of their weight when left to themselves; the contents becoming dried up gradually and reduced, so that there is left a solid residuum withdrawn toward the small end of the egg, the opposite end being filled with air. Eggs which weighed two and a half ounces when fresh, weighed but a small fraction over an ounce at the end of two years. During incubation the diminution of weight is pretty rapid.

Material for Shells.—The poultry-breeder should furnish his hens with material for strong egg-shells. This enables him to transport them without loss. He should know, also, that the embryo chick depends on the enveloping shell for material for its bones. This it withdraws and appropriates from time to time, so that the weakened walls often crush in before hatching. Sand or gravel will not make shells. Hens should be fed with the ground bones of animals, bits of old lime, broken egg-shells, or the shells of clams or oysters in a pulverized form. They must have free access to such materials to form the shells of their eggs, and to grit or gravel to grind the food in their gizzards. Mrs. J. VAN BUREN, of Clarksville, Georgia, is facetious over her success in feeding bone meal, and in this mood advises: "Don't feed your laying hens too much bone meal, for the unusual amount of cackling they will have to do may bring on bronchitis!"

Moistening the Eggs.—For seven or eight days before hatching, sprinkle the eggs with cold water while the hen is off. Colonel HASSARD, in an address before the Canada Poultry Association, said: "I prefer in cold weather to lift the hen off, wet the eggs, and put her on again. There is less risk of a chill. Many complaints are made of eggs not hatching, though there are birds in them. This is entirely caused by their being too dry. Unless moistened, the inner membrane of the egg becomes so hard and dry that the chick can not break through."

How to Make Hens Lay.—That excellent authority, C. P. BEMENT, says: "Many persons feed hens too much for laying. To keep twenty hens through the Winter, three pints of corn and two quarts of oats or buckwheat per day; also, about twice a week, give them shorts or bran wet with warm sour milk, of which they seem very fond; make it quite wet, and put in a large spoonful of ground black pepper. Give them all the green stuff that can be had, such as cabbage leaves, parings of apples, cores and all, etc. So fed, with comfortable quarters, they will lay all Winter. Keep only early Spring pullets. Change cocks every spring."

"Animal food of some sort is essential for poultry, especially in Winter, when they can not get the worms and insects which they pick up in Summer. Onions are an admirable food, or rather, an adjunct to their ordinary food. If given regularly, it is said that they will prevent the attacks of the more ordinary disease of fowls."

It is not generally understood, even by those

who profess to be most deeply versed in the mysteries of henology, that the hen being omnivorous, requires, to insure fecundity, a very liberal allowance of meat! It is, however, an undoubted fact, that feeding hens too freely on meat imparts a strong, unpleasant animal odor to the eggs.

A correspondent of the *Massachusetts Plover* recommends the following feed for hens, as a good preparation to make them lay: "Take one quart of corn and boil it in clear water, to which add, while boiling, a table-spoonful of black pepper, or half the quantity of cayenne; this quantity to be allowed to every nine hens daily, then the water to be drained off for them to drink when sufficiently cool, or to be mixed with one-third lime water."

Feed regularly. Give a variety of food, and give it sparingly each time. In noticing the habits of poultry, it will be seen that the process of picking up their food, grain by grain, is a very slow one; but it gives them exercise, and if they have to snatch for it, all the better, as this assists digestion greatly.

SAUNDERS' Domestic Poultry has the following excellent rules: "Never overfeed. Never allow any food to lie about. Never feed from trough, pan, basin, or any vessel. Feed only when the birds will run after the feed, and not at all if they seem careless about it. Give adult fowls their liberty at daybreak."

Eggs in Winter.—Dame PARTINGTON's inquiry is a common one: "Why do hens refuse to lay when eggs are dear, and always begin as soon as they get cheap?" The fact is, if poultry keepers knew how to manage their broods, they could easily have eggs all Winter. The simple conditions, which will produce this result nine times out of ten, are:

1. Get the right kind of hens; either some hardy common hens, or else the Brahma, Cochinchina, or Hamburg, or Bolton Gray.

2. The nearer the temperature of their Winter house can be made to that of Spring, the better they will lay. It should face the south, with windows to let in the sun. A tolerable warmth is indispensable.

3. They must be young; no hen over two years old will lay much in Winter.

4. They must have warm feed; a little meat and chopped vegetables now and then; some old plastering and gravel on the floor, half a barrel of ashes to roll in, and fresh water every day.

A correspondent of the *California Farmer* kept a dozen young hens, a cross between the

Chittagong and Dorking, with a strain of Bolton Gray, and says: "From this source my larder has been supplied with two dozen eggs, on an average, through the coldest weeks of the Winter, while they were commanding in the market five cents a piece. In return for this outlay of the biddies, they have been satisfied with an outlay of their owner of about one quart and a half of shelled corn daily, washed down with a dish of sour milk, with occasionally crumbs from the master's table. They have been, moreover, confined in a snug hen-house, well lighted by one large window on the south side, and provided with a box of air-slaked lime for them to pick materials from for their egg-shells, another box of gravel, and another of wood ashes, for them to wallow in at pleasure. Now and then a bone has been thrown in for them to pick, and a chunk of refuse meat, besides all the egg-shells from the kitchen. The time spent in their service has averaged fifteen minutes daily. Besides the fresh eggs, their other droppings have already amounted to two barrels of manure, equivalent to guano, with an unfailing supply in prospect."

J. L. PEABODY, of Macoupin, Illinois, tells what he learned of a Kansas man about making hens lay in Winter. He says: "He told me if I would let my hens huddle together in some warm corner, and not let them roost, I should get plenty of eggs. I had about twenty hens; my hen-house was a rough shed, eight feet square, with a small window and door on the east. I took down all the roosting poles, leaving the nest-boxes only. With a few boards I made a small shed, about four feet square, on the south side of the larger one, and covered it with corn fodder. Straw is better. I made a hole for the hens to pass from the large house into the small one. The result was, my hens continued to lay all through the cold weather. You will have to drive them in a few times at first; they will soon learn to go in themselves."

The *South Carolinian* states that hog's lard is the best thing to mix with the dough given to hens. It says that one cut of this fat as large as a walnut, will set a hen to laying immediately after she has been broken up from sitting, and that, by feeding them with the fat occasionally, hens continue laying through the whole Winter.

Two most important conditions precedent of January eggs are, a warm, clean, and well-ventilated henry, and cooked food given warm in the morning. Corn should generally be crushed or ground before feeding. Potatoes

boiled and mixed with meal while warm, are a great encouragement to hens. Buckwheat is also excellent in the rotation. A frequent feed of buckwheat, with a few boiled potatoes, turnips, mangel wurzel, or other succulent food, will generally be paid for four-fold by the eggs laid during the Winter and the Spring. Hens starved in Winter will not furnish many eggs the coming Spring; yet they may be kept so fat as not to lay at all. If kept warm, in a roomy, well-lighted henry, and fed due proportions of proper food, with other auxiliaries above mentioned, they will delight your ears all Winter long with the music of the significant cackle, and your palate with savory eggs.

Nest Eggs.—To have a supply of these, indestructible by heat or cold, just empty some eggs, as you need them, through as small an aperture as possible, mix up with water to the consistency of cream, some pulverized plaster, and fill the shells brimming full; when they have hardened, if you choose to peel them you will find them perfect; and if you think your Brahmas will be fastidious about color, a little annetto mixed in will render the illusion perfect. These are cheaper than the earthen nest eggs purchased at the crockery store.

To Cure Hens of Sitting.—A correspondent of the *Farmer's Advocate* says he cured his hens of persistent sitting, by shutting them in a tub having an inch or two of water on the bottom. He keeps them there during the day, and puts them on the roost at night. If not cured the first day, he gives them another "water-cure" treatment, when they will be glad to stand on their feet. It will also generally cure hens of sitting to place them under some up-turned box or barrel, without food for twenty-four hours. Ducking is also much in vogue as a penalty.

Raising for Market.—Poultry to fatten rapidly must be, like hogs, restricted to a limited space. Freedom and fat are incompatible. Fattening fowls should never have food lying by them, for they are just as liable to overeat as any other stock. By cramming themselves, as they often do, they impair digestion and become dyspeptic; yet, not losing an appetite for food, they continue to eat and thus make the trouble worse. When they become crop bound, although they still eat, they grow poor and sometimes die as of starvation. They luxuriate on grass or clover, which are a necessity for them; in Winter they like mangels or Swedes. They must have access to

plenty of pure water. Cooked food is the most nutritious, most easily digested, and altogether best for rapid fattening. Quietness is especially desirable, and every pen of fattening fowls, should be partially darkened.

Generally speaking, Spring chickens are the most desirable, and near cities they should be hatched in February or March and got ready for market by May or June. They require great care, but they return an ample profit. The most usual time in which hens manifest a desire to incubate, extends from March to May or June, and at this season chickens may be reared without any extraordinary precautions.

How and What to Feed.—The *Massachusetts Plowman* gives good advice, thus: "It is of no use to put up a skeleton and expect to make a fine, fat, tender-meated fowl of it by feeding in confinement. Fattening is adding fat to lean. You must have the lean laid on while the bird is running at liberty. No amount of feeding will make a hard, old fowl tender. If a hen is over ten months she may as well be ten years. She has passed the age for the table. She is old at ten months and ought not to be palmed off as a chicken.

"Four months, or at most five months, is old enough to take chickens for the table, and if you take them at that age, in good fleshy condition, three or four weeks of confinement ought to bring them into first-rate condition for the table. If they are going to market they may be crowded to advantage, but for home consumption it is not needed. If you make a coop big enough for fifteen or twenty fowls and put four or five into it they will not readily fatten. They have too much room. To fatten rapidly they must not have room to move about freely, but simply enough to stand and shift their position. They ought to be fed three times a day. Indian meal or dough is one of the best articles of food to lay on fat. Oat meal mixed with milk is also first-rate. Either substance should be fresh mixed each time, and no more ought to be given than will be eaten up at the time. If you give too much the bird will overfeed, or become cloyed, that is, the appetite is destroyed, and the food gets sour, and if the fowl does not take a decided distaste to it, it will not thrive upon it.

"Feed fattening fowls at day-break in the morning. Cover them up warm at night and protect them from cold during the day. Feed regularly, never on stale food. Never subject them to draughts of air. Never place them where they can see other fowls running about.

In these circumstances they will fatten beautifully in three weeks, and there is no known process by which they can be kept healthy after they are well fattened. Begin then three weeks before you want to kill. Calculate the number the coop will hold, and fill it so full that the fowls can do but little more than stand comfortably. You can't expect to do more than put on flesh while fowls are running at large. You can't fatten. If you want to get the highest price in market, you must coop and feed three weeks in the manner indicated."

Charcoal has been tried in fattening fowls, with marked advantage; the difference in weight produced, amounting to fifteen or twenty per cent., besides a decided advantage in tenderness and flavor. The charcoal was pulverized and mixed with the food, about a gill daily to one turkey, and also left free on the ground.

The *London Field* says: "In the course of about a fortnight to three weeks, at the utmost, a fowl will have attained, under this system of feeding, the highest degree of fatness of which it is capable, and it must then be killed; for if the attempt be made to keep it any longer in that state, it becomes diseased, from an inflammatory action being established which renders the flesh hard and even unwholesome. When the fowls have arrived at a state fit for killing, they should be kept for twelve or fifteen hours without food or water, in order that the intestines may be as empty as possible, otherwise the bird turns green and useless in a short time."

GEYELIN'S "Poultry Breeding" recommends seasoning food with salt, and adds:

"Experiments have proved that the seasoning poultry food with bay salt produces the following advantages:

"1. To render the fattening of shorter duration.

"2. To produce, with the same quantity of food, more flesh and fat.

"3. To give the flesh greater firmness and flavor, and to the fat more compactness and a finer grain."

Boiled Grain.—C. N. BEMENT says: "There is no saving by boiling oats or buckwheat to feed to poultry. Corn, on the other hand, is more profitable when boiled than when given raw, for the fowls, which would have consumed two quarts of uncooked or raw corn, consumed only three quarts of the boiled grain, which are not equivalent to three pints of raw. Even calculating that they were to consume three

quarts a day of the boiled grain, there would be a saving of one-fourth. In very cold weather, it should be fed to the fowls hot, and the water in which it was boiled may be given them to drink.

Barley is also much more economical when boiled than raw, for fowls which would have eaten two quarts of raw a day, ate three quarts of boiled grain, showing a saving of two-fifths by giving boiled instead of raw barley.

How Many Pounds of Chicken will a Bushel of Corn Make?—According to the *Western Rural*, one bushel of corn—fed raw in the grain—will produce nine pounds of poultry. J. C. THOMPSON, of New York, says that the same grain ground and scalded, will produce twenty pounds of poultry. The French never feed whole grain; they can not afford it.

How to Kill and Dress Poultry.—GEYELIN deprecates the common barbarous methods of killing, and says: "Open the beak of the fowl, then with a pointed and narrow knife make an incision at the back of the roof, which will divide the vertebrae and cause immediate death; after which hang the fowl up by the legs till the bleeding ceases; then rinse the beak out with vinegar and water. Fowls killed in this manner keep longer and do not present the unsightly external marks as those killed by the ordinary system of wringing the neck. When the entrails are drawn immediately after death and the fowl stuffed, as they do in France, with paper shavings or cocoa-nut fibers, to preserve their shape, they will keep much longer fresh. Some breeders cram their poultry before killing, to make them appear heavy; this is a most injudicious plan, as the undigested food soon enters into fermentation, and putrefaction takes place, as is evidenced by the quantity of greenish, putrid-looking fowls that are seen in the markets."

A housewife adds: "Dip the body in boiling water, then pick quick; when through douse the fowl in hot water again, then throw it into a tub of cold water; let it remain three or four minutes, this will make it swell out plump, and will keep twenty-four hours longer than if it was not thrown in the cold water."

How they Fatten Fowls in France.—In France the chickens are fattened for table use in the following ways: They are confined separately in small coops, and are not allowed to see each other or other fowls. They are crammed either with a liquid, consisting of barley meal and milk, poured down the throat of the fowl through a funnel three times a day, or they are

crammed twice a day with pellets made of meal of barley and buckwheat mixed into a paste with milk. One meal must be digested before another is crammed down. It generally takes from two to three weeks to fatten a fowl.

Peat as a Deodorizer.—The employment of peat, or dry muck, as the means of deodorizing poultry houses, appears to be worthy of more attention than it has hitherto received. The fact that from four hundred to five hundred fowls can, by its aid, be kept in one building for months together, with less smell than is to be found in any ordinary fowl-house capable of accommodating a dozen chickens, is very conclusive as to its efficacy. In the building of the National Poultry Company, where this fact has been ascertained, seven or eight fowls are kept in each compartment, twelve feet by three feet, and yet there is no smell or trace of moisture.

To this we may add that peat is one of the best compounds for hen manure, absorbing and retaining all its richness and making of it a most powerful guano. Have this regularly swept up every Saturday, packed away in barrels, and sprinkled over with plaster. DANA, with force and truth, says: "The strongest of all manures is found in the droppings of the poultry." Next year each barrel of it will manure half an acre of land; save it, then, and add to the productive energies of your soil.

To get rid of Epicurean Cats.—When a cat is seen to catch a chicken tie it round her neck, and make her wear it for two or three days. Fasten it securely, for she will make great efforts to get rid of it. Be firm for the time, and the cat will be cured. She will never again desire to touch a bird.

To get rid of Intrusive Hens.—If your neighbor's hens visit you too often, feed them some gruel, and coax them to lay their eggs on your side of the fence. Then, in your most amiable mood, show your neighbor how much your egg-harvest has increased, and beg him not to restrain his poultry of their freedom. You probably will not be troubled long, and this means of defense is perfectly just.

A few Stray Grains.—Pigeons are hatched in eighteen days; chickens in twenty-one; turkeys in twenty-six; ducks and geese in thirty—all sometimes varying a day or two. It is a good hen that will lay one hundred and fifty eggs the first year; one hundred and

thirty the second; and one hundred the third; after which she ought to "go to pot."

Try eggs by putting them in cold water. Those that sink the soonest are freshest; those that are stale or addled will float. There is no infallible test, but this is as good as any.

Pulverized charcoal given occasionally is a preventive of putrid affections, to which fowls are very subject.

Pulverized chalk administered with soft feed will cure diarrhea. This disorder is caused by want of variety in the food, or by too much green food.

Fowls exposed to dampness are apt to be troubled with catarrh, which will run to croup, if not attended to. Red pepper mixed with soft feed, fed several times a week, will relieve the cold.

To prevent hens from eating their eggs: Neatly break a hole in the end of a soft-boiled egg. Remove the contents and mix with a teaspoonful of mustard; then refill the shell. Set this in the way of the egg-eating jenny. One mouthful usually effects a cure.

To color eggs: Fowls, to which a portion of chalk is given with their food, lay eggs remarkable for their whiteness. By substituting for chalk a calcarous earth, rich in oxide of iron, the color of the egg-shells will be of an orange red.

Never permit the hens to roost more than four or five feet high, for they frequently hurt themselves in coming down. By changing roosts from eight or ten to four feet, hens will remain healthy, lay no more soft-shelled eggs, and alight without injury.

Many lose their young chickens from neglect to scald the meal, and wonder what the matter was.

In selecting fowls for breeding, we should bear in mind that in male birds full maturity is seldom attained till the third year, while the pullet in her second year generally assumes the matronly appearance of her mother. We would advise the dismissal of the cock after his fifth year, and the breeding hen after her fourth.

In France artificial egg-hatching machines are considerably used; but in this country human labor is too expensive, as compared with hen labor, to justify their adoption.

The Patent "Perpetual Hen-Feeders" will not do either; they save a little human labor, at the expense of much "hen fruit." It is found that when hens can supply themselves

indefinitely from one of these automatic machines, they get fat, forget to deposit their usual installment of eggs, and at last, very likely, die of liver complaint.

It is unprofitable to keep a large number of hens together. If many must be kept, put them in separate apartments, holding not more than ten each.

Transporting eggs by rail generally destroys their vitality.

Eggs ought to be sold by weight instead of by count; average eggs weigh eight to the pound, while of small ones it takes from ten to fifteen to make a pound.

*How Many Eggs will a Hen Lay Annually?—*A correspondent of the *Country Gentleman* said that his hens—natives—averaged only thirty-five or forty eggs a year. This brought out numerous rejoinders that lie before us, showing a much larger general average. C. N. BEMENT thought that a dozen good hens, well-kept, would furnish ten or twelve hundred eggs a year.

F. CROOK says: "In 1864 I kept forty-four hens, and had fresh eggs laid every day in the year; in January, 112; February, 258; March, 549; April, 775; May, 712; June, 579; July, 557; August, 579; September, 439; October, 247; November, 238; December, 112. Total, 5,158; average per hen, 117 each."

JAMES E. QUINLAN has gathered 2,910 eggs from twenty-seven hens in seven months. J. S. WATKINS writes: "In 1864 I kept eighteen hens, and they laid 2,793 eggs, and raised one hundred chickens; average, 155 eggs each hen. In 1865 I kept twenty-five hens, and they laid 3,326 eggs, and raised one hundred chickens; average, 133 eggs each hen. The account for seven months in 1866 is thus: Thirty-two hens have laid 2,915 eggs, and raised seventy chickens; average, 91 eggs each. Our fowls are of the Black Spanish and White Leghorn breeds."

Another says: "Last year I raised ten pullets of the White Leghorn variety; they were hatched the first of May, and commenced laying the first of September. From that time until the first of July this year, they have laid 1,510 eggs, at a cost of fifteen cents per week for keep, which amounts to \$24 95. The eggs I have sold average fifty cents per dozen which amounts to \$62 95, leaving a net profit of \$38. This year I have raised about two hundred chickens."

These are high figures; but there is no doubt

that any good breed of hens, properly kept, can be made to average, by the thousand, a hundred eggs each, annually.

Diseases of Poultry.—Generally, if a hen gets sick, it will cost more to cure her than she is worth. But there are a few common diseases that may be treated. A good preventive of disease among poultry is sulphur.

Gapes.—The gapes, an ailment of young chickens, results from a collection in the throat of numerous small red worms, which distress the chick, causing it to open and shut its mouth. The origin is thought to be the drinking of rain water or impure water; Indian meal is also believed by some to develop and aggravate the disease. Camphor is said to be a certain preventive, and a lump as large as a peanut, dissolved in a vessel from which they drink, will keep the gapes from the chickens. A thimbleful of powdered sulphur mixed in the feed once a week, is also said to be a preventive. Salt, mixed in the food of the chicks, is confidently recommended by some.

Perhaps the surest cure in the earliest stage, is the introduction of a small feather or a looped horse-hair into the windpipe, and the withdrawal of the worms. This is much practiced, but needs skill and a steady hand. After taking out the worms, give the chick a tea-spoonful of strong, black pepper water, and let it go with the mother. The worms may sometimes be dislodged and the disease cured by compelling the chicks to inhale tobacco smoke until they become insensible. Some put snuff in the mouth.

J. H. MABBETT writes: "Take a four or eight ounce vial and fill it with *large grains of wheat*; then fill the vial with turpentine and let it stand, corked tightly. When you see any of your chicks begin to droop and gasp, catch them and give each one grain of the wheat. If in the morning, give another at night. If in the afternoon, give one the next morning. I have never found this to fail in my family."

Lice.—A correspondent of the *New England Homestead* says, vermin may be driven from hen houses by the following plan: 1, Give the hen house a thorough white-washing, nests, boxes, roosts, and everything about the premises; 2, sprinkle sulphur in the nest-boxes three or four times during the year; 3, keep the floor constantly covered with ashes, loam, and gravel, and clean out at least once a month; 4, rub lard under the wings of the mothers.

Lice may be kept from fowls by applying a

drop or two of turpentine or kerosene oil upon the head and under the wings. By putting sycamore leaves, tobacco leaves, or fresh pine shavings in a nest, vermin may be banished from the vicinity.

Diphtheria.—The *American Stock Journal* says: "This disease may be cured easily by the following method: Take a small wooden paddle and remove the yellow matter from the tongue, and then apply lard and black pepper to the diseased parts. A single application is generally sufficient."

Pips.—CHARLES L. THAYER says: "Give one tea-spoonful of the best pepper-sauce every other day, and every other day give one tea-spoonful of pepper-sauce and one of castor-oil mixed, until the fowl is better. I have just cured a rooster that had the pip so bad that his comb turned very black before I knew what ailed him. I cured him with the above receipt." BROWNE, in his "Poultry Yard" advises to "feed on a low vegetable diet."

Scouring, or diarrhea is caused by the too abundant use of relaxing food. Cayenne pepper, or chalk, or both, mixed with meal or boiled rice, check the complaint.

Apoplexy.—S. M. SAUNDERS, in an essay on diseases of poultry, says: "Apoplexy with fowls, as in human beings, is difficult to cure. It is generally the result of high feeding, and is most common among laying hens, which are sometimes found dead on the nest—the expulsive efforts required in laying being the immediate cause of the attack. The only hope for cure consists in an instant and copious bleeding, by opening a vein with a sharp-pointed pen-knife or lancet. The largest of the veins seen on the under side of the wing should be selected, and opened in a longitudinal direction, not cut across, and so long as the thumb is pressed on the vein at any point between the opening and the body, the blood will be found to flow freely. Light food and rest should be given the bird after the operation."

Hen Cholera.—"This disease, so much dreaded by poultry raisers, may be checked and absolutely cured by giving the chickens, in one gallon of fresh, clean water, one tea-spoonful of chloride of lime, once a day for three or four days, and, after a few days' interval, repeating, and so on for a few weeks."

Another says: "The symptoms are lassitude and emaciation, and, in very severe cases, the voiding of white matter, streaked with yellow. This appears like the yolk of an egg when stale, and clings to the feathers near the vent.

Treatment—take white chalk, two parts; rice flour, three parts, and flour of sulphur one part, moistened with alum, to a paste. Give this twice a day till relieved. For drink, give one tea-spoonful of tincture of iron to three parts of water.

Turkeys.—The domestic turkey is exclusively a native of America,* and it is said that plain BEN. FRANKLIN wished to make it our national emblem instead of the eagle. This useful bird, graced with cranberry-sauce, has been a prominent auxiliary in the celebration of the American thanksgiving; and in 1864, there were no less than *six hundred tons of turkeys* sent to the soldiers of the Federal army in the field.

"The finest and strongest turkeys," says BROWNE'S Poultry Yard, "are those of a bronzed black, resembling, as closely as possible, the original stock. These are not only reared the most easily, but are generally the largest and fatten the most rapidly." The *Horticulturist* says: "They do not roam so much as the common turkey; they are double, treble, and sometimes quadruple the size of the common, and are also more tender in flesh, besides being a much finer-flavored bird for the table." The editor adds that he has seen those that weighed upward of forty pounds, and known of several that weighed fifty pounds.

Hatching.—The Poultry Yard says: "The turkey-hen is a steady sitter, and in this respect resembles the wild bird—nothing will induce her to leave the nest; indeed, she often requires to be removed to her food, so overpowering is her instinctive affection; she must be well supplied with water within her reach. Should she lay any eggs after she has commenced incubation, these should be removed—it is proper, therefore, to mark those which were given to her to sit upon. The hen should on no account be rashly disturbed; no one except the person to whom she is accustomed, and from whom she receives her food, should be allowed to go near her, and the eggs, unless circumstances imperatively require it, should not be meddled with. On or about the thirty-first day, the chicks leave the eggs."

Rearing the Young.—J. LUTRON says in the *Prairie Farmer*: "Young turkeys are apt to die before they attain the age of three weeks. I came to the conclusion that the fatality among them was caused by vermin, heavy feed, and

cold, damp weather. My method, this season, has been this: Take the eggs of the first laying and put under hens; the second laying let the turkeys hatch. Two or three days before hatching, sprinkle the nest and the fowls themselves with sulphur. When the young were hatched, I took a little sulphur, gunpowder, and lard, mixed, and greased their heads and necks, to keep off the vermin while the young brooded. If it does not remain on, in eight or ten days put on another coat. I took equal quantities of wheat bran and Indian meal, and wet with sour milk, or loppered milk, with a good lot of fine-cut chives, once in two or three days in it, and fed them until a month or six weeks old, then lessen the bran. Feed early in the morning to keep them from rambling in the dew. Such has been my method of management, and I have lost only two out of forty hatched."

A correspondent of the *Germantown Telegraph* thinks corn meal hurts young turkeys, and the *Country Gentleman* says: "Do not hasten the newly-hatched turkeys from the nest. Let them remain from twelve to twenty-four hours under the mother, to gain strength. When removed, feed hard-boiled eggs, finely chopped, sweet-milk curds, or eggs and milk custard cooked hard. For three or four days feed very often, every two hours at least, and keep from dews and rain. Give no uncooked Indian meal, and no food of too soft or watery a nature. Give plenty of pure, fresh water, sour-milk curds, cracked corn and barley, wheat and rye, and plenty of onions, root and top, chopped into their feed."

Turkeys are generally a very profitable "crop;" averaging, in many parts of New England, nearly a hundred per cent. net upon their cost. Every farmer can afford to keep some; for they need little care except in wet and cold weather, when they should be housed. Turkeys caponized (castrated) fatten faster, and with less expense, and make sweeter flesh.

Ducks.—The duck in its wild state is found throughout Europe, Asia, and America. He is a magnificent fellow, and it is hard to understand how the symmetry of his shape should have so entirely departed, and his gray coat—green and violet and orange and brown—should have faded to such a draggled-tail dinginess as marks the domestic duck of the modern poultry market. Naturalists count nearly a hundred species of the duck genus scattered over all parts of the world; and there is little doubt that the intending keeper of this profitable

*The tame turkey is derived from the wild turkey of Central America, and not from that of the United States, which is quite another species.

bird may take his choice from at least twenty different sorts. Light-colored ducks are generally of milder flavor and less gamy than their darker brethren; and those that are reared exclusively on vegetable diet will have whiter and more delicate flesh than those allowed to feast on animal offal.

All ducks are good layers if they are carefully fed and tended. Ducks generally lay in the night or early in the morning. While a duck is in perfect health she will do this; and one of the surest signs of indisposition is irregularity in laying. The eggs laid will invariably nearly approach the color of the layer—light-colored ducks laying white eggs, and dark ducks greenish-blue eggs; dark-colored lay the largest eggs. The simple way to fatten ducks is to let them have as much substantial food as they will eat. They will require no cramming; as they will cram themselves to the verge of suffocation; they should at the same time be allowed plenty of exercise and clean water. The Aylesbury duck is a favorite in Great Britain for its large size. Its snowy plumage and comfortable comportment makes it a credit to the poultry yard, while its broad and deep breast, and its ample back, convey the assurance that your satisfaction will not cease at its death.

Ducks, which are the most industrious and voracious devourers of insects, have this advantage over their feathered congeners, that they can not scratch, and have very limited powers of flight over fences and other barriers into forbidden precincts. A correspondent sets forth that ducks fatten twice as rapidly as chickens, some of them putting on fat at the rate of two pounds a month.

The Guinea Fowl.—The Guinea fowl has advantages; it is hardy, and very prolific of small nutritious eggs, with hard shells, capable of being transported any distance. When young, it is delicate eating, the flesh being little inferior to our partridge, and in season when chickens and prairie hens are scarce—in March.

And it has disadvantages; a song like a handsaw, but good to scare away thieves and hen-hawks; they mate in pairs, necessitating as many males as females; they are not good sitters, but the hen that hatches their eggs must be, for the term of incubation is longer than that of chicks. The terrible and incessant clatter of the Guinea hen—"buckwheat!"—has prevented her from becoming a favorite any-

where. One is inclined to address her as O'CONNELL did the noisy fellow who was interrupting his speech: "I wish you had a hot potato in your mouth."

Geese.—The goose is an historical bird, but it dates so far back that its origin, and even its precise ornithological classification, is unknown. The varieties of the tame goose are numerous. They are a great nuisance when permitted to go at large.

The white China and Bremen geese are larger and better than our common breeds, being far more prolific, and good sitters and mothers; their feathers are more plentiful, and sell at a higher price, and they are more profitable in every way. The China geese are all specifically, if not generically, distinct from our common geese. They are distinguished by a large knob or excrescence on the top of the bill next the head, that increases with age; beak strong and high-ridged; their attitudes graceful and swan-like on the water, but stiff and usually quite erect on land; voices, harsh, loud, and frequent; while their wings and tails are short, rendering it difficult for them to fly. Time of incubation, thirty-three to thirty-five days. There is generally great dissimilarity in size, the ganders being much larger than their mates.

A correspondent of the *Ohio Farmer* gives his method of hatching: "I make a deep nest of horse dung, cover with a little straw or leaves; wet the eggs about twice a week with salt water; the eggs usually hatch well, and the goslings are strong and healthy. I have had them come off before the snow was gone. Then for feed, I cut a handful of hay quite fine several times a day, and give them a little corn dough and salt it as for myself; have salt and fresh water for them to drink. I always take them from the hen, when they are old enough to run, let them have a yard, and take them in nights. Most people feed their goslings too much."

THE HONEY-BEE.

The culture of the honey-bee has not received, in America, that intelligent attention which it deserves. Out of a hundred bee-keeping farmers, not ten even try to learn the habits or requirements of the ingenious creatures which they expect will furnish them with delicious food. The old barbarous methods are

still largely in vogue; hives remain a prey to mice and moths, accident and famine, overrun with weeds, and left to decay. Formerly it was an inhuman practice to suffocate and destroy the bees, thereby uniting murder with robbery; but good managers have, for many years past, preserved them, and fed them during the Winter, by which plan five hives, on one pound each, have, in ten years, yielded a profit of one thousand two hundred and eighty pounds. To destroy the swarm for the sake of the honey is like cutting down fruit trees to get the fruit.

One thing may properly be said here: Bees will not thrive under the indifference with which most farmers regard them, and a man had better let them alone, or, at least, not keep them as an item of profit, unless he is willing to read and follow some reliable treatise on bee-culture, like "LANGSTROTH on the Honey-Bee," or QUINBY'S "Bee-Keeping Explained," and then give a few minutes *every day* to ascertain the condition and needs of his busy colonies."²

Natural historians celebrate the industry, wisdom, economy, and foresight of these little creatures, and their sagacity, approaching to reason. They are divided into three classes, queens, drones, and workers—these three orders forming a strong, harmonious, centralized government. It can, perhaps, hardly be called a republic, as it fosters an order of aristocracy in the drones, and the queen rules supremely, coquetting with her large and burdensome class of nobility, until the days get shorter, when they are slain by an insurrection of workers—the old protest of the commonwealth against indolence. The three classes in every bee-hive are:

First, the queen—the only perfect female. The queen is considerably larger than a drone or worker, and so different as to be readily distinguished. She is sometimes a glossy black, with orange underneath the body, sometimes a ring of orange where the body and abdomen meet. Her antennæ turn down, and her wings, from the length of her body, seem shorter than those of drone or worker. She possesses her weapon of defense, in common with the worker, but is said never to use it except upon a royal rival. She enjoys longer life than her subjects, and feeling the perpetuation of her species to rest upon her, she goes forth but once to fit her for maternity,



Fig. 1—QUEEN.

and then remains in the bosom of her faithful subjects, assiduously restoring the ravages time makes in her people.

She is the only mother of the hive, and deposits a fabulous number of eggs, sometimes 75,000 or 100,000 per annum. The eggs become males, or drones, females and neuters, or workers. When the hive becomes too full for thrift or comfort, the queen leads forth a mixed colony of young and old, and recommences her procreant duties. Her fertility decreases with age, and expert apiarians give young queens to their stocks at pleasure. If she die, the workers raise a new monarch from a neuter egg, by transferring it to a royal cell, feeding it on royal ambrosia, and subjecting it to their mysterious alchemy.

Second—the drone, or male. These lazy and helpless aristocrats of our little insect monarchies have been the subject of lively dispute, but American naturalists have at last concluded that, as Nature has furnished them neither with means of self-preservation nor defense, they exist solely for the continuation of their



Figure 2—DRONE.

species. Drones are produced from the same kind of eggs as workers, fed on a more liberal allowance of different food. Their luxurious existence is brief. Coming with the flowers of Spring, they are slain before Winter, by the workers, who know them only as dependent idlers. Drones can not sting; can not gather pollen, secrete honey, or practice the art of masonry. Modern inquiry having ascertained their only use, bee-raisers regulate their number, and discontinue their production, by removing drone-combs from the hive.

Third—workers. The little brown worker; the "busy bee" of the moralist and poet, is too well known for description to be necessary. They are smaller than queens or drones, and of different organization. They are called neuters, being undeveloped females, not possessing the power of procreation. They are admirably adapted for ceiling their houses, building the elegant comb that fills them, and gathering and conveying to its dependent inmates the food and water that sustains them. They are divided into courses for the systematic performance of their duty of sentinels, foragers, ventilators, comb-builders, com-



Figure 3
WORKER.

* The American Bee Journal is published at Washington, District of Columbia.

missaries and nurses of the young. With their tongues, a very changeable shaped and adaptable instrument, they construct their marvelous combs, succeeding each other, so as to keep the work always in progress—neither night nor inclement weather stops this labor.

In proportionate size, the queen bee is eight and a half and the male seven, and the workers six. A queen will lay two hundred eggs daily for fifty or sixty days; and the eggs are hatched in three days. The workers are five days in the worm state, and in twenty days become bees. The males are six or seven days in the worm state, and in twenty-four days they become bees. A queen is five days in the worm state, and in sixteen days is perfect. When eggs are converted into queens, the old queen destroys them; or if there are two young queens they fight till one has killed the other. There are about nine thousand cells in a comb of a foot square; their first purpose is as nurseries for the young, and they are then cleaned and filled with honey. Five thousand bees weigh a pound.

Fertility of the Queen.—We extract from the *Canada Farmer*: "Generally within five or six days after emerging from the cell, the queen leaves the hive for a meeting with the drone, which takes place on the wing, and usually high in the air. She commonly leaves the hive between the hours of twelve and three o'clock P. M., when the drones are on the wing. If she does not meet with the drone she returns to the hive, and in a short time goes out again; this she continues to do every day until she mates with the drone and becomes impregnated, when she returns to the hive, not to leave it until she goes off with a swarm. Having mated with a drone, she becomes impregnated for life, and under favorable circumstances commences to lay within forty-eight hours. In some cases it may be much longer, extending to five, six, or even ten days; such cases, however, are rare. Another peculiar characteristic of the queen is, that if she does not meet with the drone within the first twenty-one days of her existence, she becomes incapable of being impregnated, and hence never makes anything more than a drone-laying queen. We here see the wisdom of the Creator in the provision of so many drones. The chances of the queen to be destroyed are numerous, the time for impregnation short, hence the necessity of her meeting with the drone as soon as possible, that she may retire to the hive, where the chances for her destruction are greatly lessened. An unimpregnated queen

may easily be known by her slim, tapering abdomen, shy and rapid movements; the abdomen of the fertile queen being much larger and longer, and her movements more stately and regular. The queen generally lives to the age of four or five years, though she usually ceases to lay eggs that will produce workers after the fourth year—in other words, her fertility ceases, and though she may continue to lay eggs, they will only produce drones. The consequence is, the stock will soon dwindle away and perish."

Products of Bee Labor.—The following are the varied products of the toil of the working bees:

Propolis.—They collect propolis, a resinous substance, from the buds of trees and other sources, with which they coat the inside of their hives, close crevices, and indeed, sometimes embalm an offensive substance which they can not remove.

Pollen, or Bee-Bread.—They collect pollen from the antheræ of flowers and other sources, brushing it as they do propolis, with their fore legs and wings, into the basket-like cavities in the thighs of the back legs. They announce the arrival of such supplies at the hives, by a beating of their wings. If it is not at once consumed by the workers, it is stored for future use, and constitutes that dark semi-liquid substance called bee-bread, which, when ignorantly received into the mouth, is rejected as speedily as the most nauseous drug.

Honey and Wax.—They collect nectar, with their proboscis, from the nectariferous glands of flowers, and juices of fruits. This is conveyed to their second stomach, from whence, like ruminating animals, they bring it up and deposit it as honey, or elaborate it as wax. Wax is produced from honey by some chemical change in the honey-sack, and is exuded from between the rings of the abdomen at the will of the bee; as is proved by their commencing at once, or deferring a day or two, the building of comb in their hives, after swarming.

Taming the Honey-Bee.—It is well known by all scientific apiarists that the honey-bee is tractable, and is capable of being, to a certain extent, tamed and domesticated by any intelligent person who will go at the work kindly. LANGSTROTH explains the method of controlling this irascible insect by three rules, expressed in the following formulas:

1. "A honey-bee, when filled with honey,

never volunteers an attack, but acts solely on the defensive.

2. "Bees can not, under any circumstances, resist the temptation to fill themselves with liquid sweets.

3. "Bees, when frightened, begin to fill themselves with honey from their combs."

According to the first rule, bees are generally good-natured at the hour of swarming, for before leaving the old hive for another they always fill their honey-bags to the utmost capacity. None sting unless they are crushed, except a few thriftless fellows who have neglected their rations.

Under the second rule, bees can always be managed. "If," says LANGSTROTH, "as soon as a hive is opened, the exposed bees are gently sprinkled with water sweetened with sugar, they will help themselves with great eagerness, and in a few moments will be perfectly under control." Visitors are always welcomed by bees thus treated; but all motions about a hive must be quiet and slow, and the keeper should familiarize his colonies with his presence.

Under the third rule, bees can be handled without danger. Again we quote LANGSTROTH: "If the apiarian only succeeds in frightening his subjects, he can make them as peaceable as though they were incapable of stinging. By the use of a little smoke from decayed wood (spunk or touchwood—the smoke directed upon the bees by the breath of the apiarian) the largest and most fiery colony may be at once brought into complete subjection. As soon as the smoke is blown among them, they retreat from before it, raising a subdued or terrified note; and, seeming to imagine that their honey is to be taken from them, they cram their honey-bags." Tobacco smoke is equally effective, and the same consternation may be produced by shutting the bees within their hive and drumming upon it.

Swarming.—Of natural swarming, "a housekeeper" in the *Cultivator* says: "This most interesting event in bee-life and bee-keeping, used to be the only occasion when old fogies intermeddled with their bees at all, until their combs being filled, they were deemed fit for destruction, and when, like Sodom and Gomorrah, they perished in vapors of sulphur. The old queen of the hive leads out the adventurous emigrants, whether in a fit of jealousy toward her aspiring offspring, or like a good human mother she prefers the hardships of pioneerage herself, we wot not; but her loyal followers are

of all ages and conditions. They will sometimes precede her, but return again to the hive until she accompanies them. They usually cluster near the ground, on some convenient bush; sometimes inconveniently high, and in a freak occasionally on another hive, or even on a bystander. Sometimes they hie away to unknown parts. Sand or water thrown among them will often bring them to a halt. Cluster bushes, or a pole with a knot on the top of mullein-seed or pine burrs, or even swarm-catchers of muslin, are sometimes employed to facilitate measures. Wherever clustered, proceed quickly to hive them, all things being always kept in readiness in this important season. Have a table in the shade; a sheet spread over it; a hive thereon a little tipped up in front. Cut off the switch on which the bees are clustered, and shake them off under the edge of the hive. If in a large body, brush off the bees into a basket; if on a high limb, fasten the basket on a pole, and have the limb jarred while the basket is held under the limb; empty the basket under the hive. If any bees are dilatory about entering, sprinkle gently to expedite them. Set the hive at once on its stand, and keep it shaded.

"If two swarms come off simultaneously and cluster together, if small hive together; the royal ladies will settle the question of right to reign, speedily, and you will have a good strong stock. If the swarms are large, and you wish to divide them, spread a sheet on the ground, set two hives, and with a dipper divide the bees equally between the hives. If you unfortunately give one hive both queens—you will soon know it by the commotion of the queenless stock—shut them up quickly with the wire-bottom board, empty the other, and search for a queen. If lucklessly she has been killed, return the queenless stock to the parent hive, and it will swarm again in a few days; or, if you use movable combs, give it a frame or two of brood comb, and, if possible, a queen. If you use the box hive, it is best to return late swarms to some weak stock, or unite two and foster unremittingly.

"In olden times bees used to swarm two or three times in a Summer; this event occurring in from nine to twenty days. This event is much rarer now. These second swarms, being led by young queens, are not so particular in choosing middays or fair weather. If these swarms occur late in the season, unite two; if buckwheat is abundant, they will provide amply for themselves—otherwise you must be

charitable to them. The piping of the young queens usually indicates these coming swarms—this note is supposed to be the cry of the royal infant's for release from the nursery."

A Swarming Pole.—A man who has proved its practicability, recommends the following method of securing a swarm: "Take a long pole, and make the small end bulky by wrapping paper around it about as thick as a man's arm, and half as long; then bind a black cloth about it, and secure it with a cord. When the bees are swarming, as soon as they attempt to settle, put that end of the pole in the place where they are about lighting, and usually they will settle on it immediately, but should they persist in settling on the limb, or whatever it is, jar it so as to disturb them, and they will leave it for the pole; when they are all clustered lay it gently down, and set the hive over them. Sometimes when fastened pretty firmly on the pole, it is expedient to shake it a little to make them leave it for the hive. We have tried this simple plan for years, and have seldom failed."

A Convenient Bee-Hiver.—The accompanying cut and following description are from TUCKER's *Rural*. The plan appears practicable:



Fig. 4—BEE-HIVER—MADE OF BOARD WITH CORN COBS SET IN.

Take a board as large as the bottom of the hive, bore a number of holes through it, and insert corn cobs through these holes; then nail securely a handle eight or ten feet long, to this board. Nail a narrow board so as to form a sort of hood over the cobs when it is set up. Make a slanting hole with a crow-bar in the ground, and thrust the pole or handle into this hole. If these cobs are dyed a dark-brown color, the bees will be almost sure to light upon them. But should they light on the branch of a tree a few gentle taps against the limb, will induce them to leave it and adhere to the cobs. These, from their rough surface, will enable the bees to hold on firmly. When they have settled, take out the pole, lay the instrument flat, and place the hive on the board

which holds the swarm, and the thing is done. In large apiaries two or three of these may be on hand for use.

Another Easy Method of Hiving.—A correspondent of the old *Yankee Farmer*, says he has practiced the following plan with complete success for fifteen years, and he has never known his bees to pitch on any other place than that prepared for them: "Drive down two stakes, about four feet apart, fifteen feet in front of the bee-house; tie a pole across these stakes, about three feet from the ground; then take a board one foot wide and twenty feet long, and lay one end on the ground, at the front of the bee-house, and lay the other part on the pole between the stakes. Put up this board in the beginning, and let it remain till the close of the swarming season. The bees will pitch on the under part of this board, and then that end which lays on the ground should be raised to a level with the other, and put on a barrel, box, or something else. Then turn the board upside down, and place the hive over the bees, and fasten it with props, to prevent the wind blowing it down. By having a board not more than a foot wide, the hive will extend over the board, and be less likely to kill the bees when it is placed over them, and it will leave room for the bees that may be outside the hive to pass into it. Mr. WINSLOW observed that he had sometimes found three swarms at once pitched on one board in different places. When he first put up the board, he usually rubbed on it some honey, salt water, or the like; but this may not be necessary."

Artificial Swarming.—Transferring all or a part of the bees from one hive to another, is a great advance in bee-culture and perhaps the boldest step in the profession. In skillful hands it can almost always be successfully performed, but it should be done in the early part of the swarming season, and from crowded stocks. Mrs. ELLEN S. TUPPER, an accomplished apiarist, who gathers health and profit from the pursuit, says in the *Iowa Homestead*:

"Bee-keepers must decide in this month whether they will let the bees take their own way about swarming. For ourselves we never allow any natural swarms. It is much easier, we find, to keep the matter under our own control, make as many colonies as we deem best at our own time, and thus keep all colonies strong, and secure the greatest yield of surplus honey. To do this in the best and simplest way, some form of movable-comb hive is indispensable, but even those who have only box hives or

gums, need not subject themselves to the watching and uncertainty attending natural swarming. Those who wish to transfer their bees to movable-comb hives will find swarming time the very best time to do it.

"Smoke the hive from which you wish to take a swarm, carry it a few yards from its stand, turn it upside down and place over it a box or hive as nearly as possible the same size, and stop all holes between them; then drum on the lower hive with sticks, keeping up a steady noise and jar for fifteen or twenty minutes, and the bees, with their queen, will go into the upper box. [If the queen is not in the upper box, the bees will be restless.] If this box is the one which you wish to keep the bees in, you have only, when the bees have gone up, to set this on the stand where the old hive stood and carry the old one to a new place several yards away, and the thing is done. The bees in the new box will do in every respect as well as a natural swarm, the old hive, having plenty of hatching-brood and eggs, will at once rear a queen, and do as well as if no bees had been taken from it.

"If you wish to have a new swarm in a movable-comb hive, after you have driven them into a box as described, spread a sheet before the new hive, which is placed on the old stand, then empty the bees upon it and allow them to creep up into the hive. It is well, if possible, to have pieces of comb fastened in the frames, as a guide and encouragement to the bees.

"CAUTION.—Never expect to gain anything by dividing a swarm before it is strong in numbers; unless the colony be large, and the old one be left full of brood, it is better undisturbed. 2. Don't wait until the bees are hanging idle outside the hive. Unless swarms are made in May or early in June, they are not to be relied on. 3. The new colony *must* be placed where the old one stood, else the bees can not find it; the old one must not be placed too near the place. If the bees are Italians, enough will find it if it be placed a rod away. The black bees do not as readily seek the old hive, and two or three yards is far enough to move their hive. This way of swarming we practiced for years with perfect success. It is a poor substitute for the manner in which multiplication of colonies can be performed by the use of movable frames, but we recommend it as far preferable to natural swarming." The hive containing the forced swarm, should be of the same shape and color as the parent hive.

slightly, removing from the old hive only two-thirds of the bees, with their queen, and then returning it to its former stand, instead of putting the new hive there. LANGSTROTH says that some loss is apt to follow either method; if the old hive be put back, too many of the bees in the other will be likely to return to it; and if its location be changed, its unsealed brood may perish from neglect. He, however, agrees that it is better than natural swarming; which is objectionable on account of the time and labor it requires, the loss of swarms that attends it, and the fact that many hives refuse to swarm at all.

Some prefer another mode of forming an artificial swarm, thus detailed by LANGSTROTH: "After the bees have been driven from the parent stock, the forced swarm is at once placed on the old stand, while the parent stock, in which the proper number of bees has been left, is set in a cool place, and shut up—care being taken to give them air—until late in the afternoon of the third day. It may now be put on its permanent stand, and opened an hour or two before sunset, when the bees will take wing almost as if intending to swarm. Some will join the forced swarm on the old stand, but most, after hovering a short time in the air, will re-enter their hive. While the entrance was closed, thousands of young bees were hatched, and these, knowing no other home, will all unite in the labors of the hive. The imprisoned bees ought to be supplied with water, to enable them to prepare food for the larvæ. In the common hive this may be injected with a straw through a gimlet hole."

An observing farmer says: "But to have a sure success you must have a Langstroth or other movable-framed hive, and with a partition through the center of each frame, you tie in with strings all pieces of nice *worker* comb containing brood, or honey mixed with bee-bread and unfit to eat. With three or four frames filled with *worker* comb, and as many more empty frames placed alternately, first a full frame, then an empty one, and plenty of buckwheat or other Fall honey-producing flowers, you will have a colony in good shape to Winter."

Chloroform.—A writer in the *Maine Farmer* says: "Having had little satisfaction and much trouble in fumigating bees with puff ball, etc., I bethought me to try chloroform, and shall never use anything else in future. I put about ten drops on a bit of rag, pushed it under the hive from behind, and in about five minutes

Another correspondent varies the method

the bees were all on the bottom board. In this way I united two small swarms most successfully." We advise a cautious testing of this method.

To Prevent Swarming.—It is sometimes preferred not to increase the number of hives. Such may be interested in the following, contributed to the *Annual Register* by Mr. QUINBY: "It has been ascertained that if abundant room be provided by surplus boxes being placed in immediate contact with the main combs of the hive, the bees that might go off in the swarm would usually remain at home and fill the boxes. This use of surplus boxes at the sides, as well as on the top of the hive, with clean guide combs properly adjusted, has a tendency to prevent four-fifths of the swarms as demonstrated by Mr. HAZEN'S hive, and when no swarm issues, it is reported that the average yield per hive will be one hundred pounds. If an increase of stocks is wished for, the product of one will buy several.

"As a further security against swarming, a device has been offered which prevents the queen from leaving. A pen or yard is made in front of the hive, eighteen or twenty inches square. Nail together strips that will make it about three inches deep, with floor of thin boards, excepting a strip four inches wide next the hive, which should be of wire cloth for sifting out dust and for ventilation. Around the top on the inside, fasten a strip of tin three inches wide, in such a way that it will be parallel with the floor, and thus prevent the queen, whose wing should be clipped, from crawling over. She will creep up the side, but being unable to hold fast to the under side of the tin, will fall back, and finally return to the hive with the bees that will not go far without her. The upper side of the tin should be painted some light color. Cut a place for entrance on one side of this pen, to correspond with the entrance of the hive. To prevent their rearing a young queen that may supersede the mother, and can fly, it will be necessary to open the hive once in eight or nine days, and remove all queen cells, or if it is wished to replace the old with a young queen, let one cell be left. There will be no risk of a swarm in that case, and when she begins to lay clip one wing."

Artificial Feeding.—Mr. T. F. BINGHAM advocates feeding bees to induce early breeding. He states that in many parts of the country, where bees were profitable in years past, it is not so now. Owing to cutting down

the timber, reclaiming swamp lands, and bringing a larger area into cultivation, early forage is rendered scarce, and the principal crop for surplus, white clover, comes in bloom before the hive is sufficiently populated to take advantage of it. Bees hatched during its bloom are consumers, whereas had breeding been stimulated earlier, either from natural sources or by properly directed feeding for six or seven weeks before the clover harvest, the most marked results would follow. In such districts he recommended feeding from one to two ounces daily of sugar syrup, according to the strength of the colony. The benefit is not only to the owner in surplus honey, but the hive will swarm earlier, and all know the advantage of a few days to a new swarm.

"The number of days in a season in which bees gather more than is consumed in breeding, or by young bees who gather nothing for about the first ten days of their existence, is more limited than most people suppose. Some seasons it is less than a fortnight. Feeding swarms, weak in stores, to enable them to pass the Winter in safety, should be done as rapidly as possible after the queen has ceased laying in October; otherwise they will consume much in rearing young, when their population may be already sufficiently strong. By feeding regularly and sparingly I have kept young queens laying more or less freely, until the middle of November." Buckwheat and clover are the best food for bees; though authorities state that the former only yields honey to them from sunrise until eleven o'clock A. M., unless the day should be damp.

Preparations for Winter.—As soon as bees have finished storing surplus honey, it should be removed and the colonies equalized and prepared for Winter as speedily as possible. Each colony should be made strong in both stores and numbers by the first of Winter, and the earlier in the Autumn this is done the better it will be for the owner. Says a bee-keeper: Small swarms should be united so that each swarm will have from four to six quarts of bees. To unite them I prefer to fumigate them with puff-ball smoke, then put them together and let them revive in the hive in which you wish to have them remain. I prefer to remove all the queens except the one which I think is the best. An Italian queen may be introduced to such a swarm with perfect safety if all the other queens have been removed.

"Now see that all have feed enough to last them until Spring. It is more troublesome and expensive feeding in Winter or early Spring than in warmer weather. Feed only good northern honey or syrup made of good refined sugar. I have used brown coffee crushed and mixed with a little cream of tartar, with satisfactory results. For a feeder fill a fruit can, glass bottle, or other convenient receptacle with feed; then tie a thin piece of cotton cloth over it and invert it over a hole in the honey-board where the bees will have free access to it. They will suck the feed through the cloth. You can feed a little faster and perhaps easier by using an upright tin or wooden box with a float in it. It should be set in the top of the hive. Each hive should weigh at least thirty pounds in addition to its empty weight."

Bees eat, on an average, fifteen pounds of honey per swarm in the Winter, varying fifteen pounds, according to the severity of the weather, and the size of the colony. An old bee-keeper says: "Take a small loaf of rye and Indian, or Graham bread, cut in two, and saturate the inside of each piece with good sugar water and place it over the bees, covering close to keep warm; they will eat the inside out as clean as mice."

During those Winters which follow bad honey seasons, many hives of bees will perish unless fed artificially. Bees may have too much honey to Winter well. WILLIAM W. CARY says, bees will not Winter well in solid honey; there must be a fair number of open cells for them to cluster in and keep up their heat by being in a compact mass.

Wintering in the Cellar.—Throughout the Middle and Southern States a thrifty hive will Winter out of doors with ordinary protection. Indeed, LANGSTROTH lays it down as a rule, that "if the colonies are strong in numbers and stores, have upward ventilation, easy communication from comb to comb, and water when needed, and the entrances are sheltered from piercing winds," they will generally Winter successfully in the open air.

But it is well-known that bees, like all animals, eat in very cold weather for the purpose of keeping themselves warm; from which it follows that they will consume less honey if their temperature can be kept up by the warmth of the atmosphere. Most of the best apiarists above the Ohio are adopting the practice of Wintering their bees in the cellar, a custom long in vogue in Europe. If the cellar is dark and dry, and the temperature does not vary much

from 36° it makes an excellent Winter bee-house. Between 32° and 40° bees keep very quiet, and consequently eat little.

There should also be secured, if possible, a uniformity of temperature. Bees can not do well if subject to extreme and sudden changes.

Ventilation, Light, etc.—Be sure that the hive is well ventilated. There should always be an opening of some sort in the top of the hive, so that the air within may be dry and pure; otherwise the moisture of their breath will condense in the hive, chill the bees, and eventually kill them. To prevent annoyance from intruding insects, the opening may be protected by wire cloth, or something of that sort. Keep the hives well darkened, in order that the bees may not be tempted out on warm, sunny days. A light carried into the cellar for the purpose of getting vegetables, or any other purpose, disturbs the bees. After they once crawl or fly away from the hive, they seldom get back again.

A bee-keeper says of ventilation: "If straw or the old-fashioned board hive, they should be turned bottom-side up with the bottom boards removed. The animal heat will then drive all the dampness and mold out of the hive. If movable-comb hives are used, the caps, boxes, etc., should be removed and the hive allowed to remain right-side-up, with the entrance closed."

Mr. CARY says: "We have wintered from fifty to seventy-five swarms in our cellar, for several years past, with good success. Our cellar is very dry. Bees never should be put into a damp cellar, as the combs would be very liable to mold; they had better be left on the Summer stands. I also use LANGSTROTH's movable-comb hives, and leave all the holes open in the honey-board, twelve in number, the entrance also being left open. I should prefer removing the honey-board entirely, if it were not for mice."

Another, who claims extensive experience, urges that, "In frame hives there should be no top ventilation directly through the top of the honey-board, but what I should term a side-top ventilation. This can be accomplished by having an inch hole through the sides of the hives, two inches below the honey-board. If directly through the center of the honey-board, there is too great a circulation of cold air, keeping the bees in constant commotion. The side ventilation, the top being entirely closed, the inch holes two inches below the honey-board, has a tendency to reverse the breath of the bees back

upon the top of the frames, forcing it to pass out at the sides, two inches below the top of the frames, keeping the top of the frames warm enough at all times for the bees to pass over from one frame to the other, in the coldest of weather, for food, etc."

Burying Bees for the Winter.—Above the latitude of 40°, wintering bees in a vault in the ground is somewhat practiced by those who have not dry and equable cellars or convenient dark rooms; but it is indispensable that the spot selected should be absolutely dry. With care in wintering, bees will eat one-third less honey than if left exposed. CHARLES DADANT, of Hamilton, Illinois, says in the *Bee Journal*:

"Low and uniform temperature, dryness, tranquility, security against mice, and slow renewal of air, are conditions required for wintering bees in the ground. I use the mode which experience has proved successful.

"In well-drained sloping grounds, I dig a ditch half a foot deeper than my hives are tall, and one foot wider than they are broad. I drain that ditch for greater security. If fearing the falling in of the earth, I lay the ground with some old planks. Then I lay in the bottom two four-by-four-inch beams. Upon these I place my hives, having previously raised them from their bottom boards by inserting strips of half-inch lath. I remove top boxes, and leave open all the holes in the honey-boards, in order to give the bees plenty of air. Then with plasterer's lath I frame ventilating pipes or flues to the surface, the longer ones descending to within four or five inches of the bottom; the shorter ones to be placed in the roof. I place one of these flues at each end of the ditch, and another after each third hive—alternating a long and short one. These should be secured against mice. Finally, I prepare a support for a double-sloping roof of old boards, and then cover the roof with straw nearly a foot high, and place on that a layer of earth, equally thick—making altogether eighteen or twenty inches.

"By these means bees are maintained in a low temperature, and remain dormant for months, consuming little honey; and are all alive and active in the Spring. This is the best way to Winter feeble and poorly supplied flocks. Last year I wintered some thirty swarms in the ground, giving them honey in boxes, which remain untouched—the small quantity of honey they had in their hives having been sufficient for their support."

Feeding in Spring.—Another correspondent of the *Bee Journal* says of feeding in Spring: "I consider feeding bees in the Spring of as much importance as feeding any other stock. The apiarian should furnish his bees with unbolted rye flour, water, and sugar syrup, as early in the Spring as the weather will permit. They seem quite pleased, and I have no doubt but the rye flour answers the purpose of pollen in feeding the young bees. It may be given them two or three weeks before they can obtain any from abroad. They can not rear their young without pollen water, honey, or a substitute. A good substitute for honey is a syrup made by adding four pounds of water to ten pounds of good brown or coffee sugar, boiled five minutes, and skimmed. This may be furnished for one-third the value of honey, and every pound fed fills the place of a pound of honey for feeding the young brood. I use a feeder that is so constructed that I can furnish my bees with honey, rye flour, and water, all at the same time, and perfectly secure from robbing bees.

"I have had considerable experience in feeding bees, and find it very profitable for three reasons. First, I save all swarms from dying in the Spring for the want of food; second, my bees swarm from two to four weeks earlier than if they were not fed. A little food in the Spring stimulates the queen to lay more abundantly, for bees are provident, and do not rear their young so rapidly when their supplies are short; third, I secure a larger surplus of honey by allowing the bees to fill the store combs with syrup, thereby obtaining the honey as a surplus in the surplus boxes.

"I consider one young swarm of bees, that issues the last of May or first of June, worth more than two in July, for they will make from thirty to fifty pounds of surplus, while the July swarm will hardly make enough for their Winter's consumption."

Exposure in Spring.—Colonies of bees which have been wintered in a dark chamber, vault or cellar, should not be replaced on their Summer stand till the Winter is thoroughly broken, and a mild day when the bees can fly, should be chosen for the removal, otherwise many will be lost by the untimely exposure. LANGSTROTH explains this: Bees very rarely discharge their feces in the hive, unless they are diseased or greatly disturbed. If the Winter has been uncommonly severe, and they have had no opportunity to fly, their abdomens, before Spring, often become greatly distended, and

they are very liable to be lost in the snow, if the weather, on their first flight, is not unusually favorable. After they have once discharged their faeces, they will not venture from their hives in unsuitable weather, if well supplied with water.

Bee-Hives.—For people who don't take care of their bees, the old-fashioned box-hive is as good as anything, and a hollow tree about as good as the box-hive. For those who give their colonies due attention, the movable-comb hive of L. L. LANGSTROTH, of Oxford, Ohio, or one combining its chief excellencies, should always be used. Mr. QUINBY, one of the largest apiarists in America, says: "I think I have found a hive superior, in many respects, to the simple box. It is not pretended that a swarm of bees located in it will store a greater amount of honey in a given time; the advantages are in the control of their operations, and *knowing their condition at all times.*" But there are other obvious advantages which Mr. QUINBY tersely sets forth: The movable-frame hive enables the owner to remove the honey, in part or in whole, at pleasure, without disturbing the bees; to transfer a part of the colony to another hive without natural swarming; to overlook the frames and cut away the surplus queen cells, thus preventing overswarming; to substitute worker comb for drone comb; to strengthen weak colonies by giving them brood combs; to remove worms; in short to exercise complete and constant supervision over the bees, studying their habits and supplying their wants. Ignorant, nervous, and thriftless people should stick to the ancient tight box; but we cordially agree with Mr. QUINBY that "there is not the least doubt that whoever realizes the greatest possible benefits from his bees, will have to retain the movable combs in some form. The principle can hardly be dispensed with."

LANGSTROTH's hive, with its adjustment of the frames, is patented; but the movable frame is not patentable—anybody can make them. SOLON ROBINSON described them twenty years ago in the *Cultivator*, as they were used in England: "The form of the hive there recommended was to hang the frames by hook and eye-hinges to the back of the hive, so that all would swing like the leaves of a book standing on its end. The front, or cover to the edge of the leaves, being opened, leaf after leaf could be lifted off its hinges and a new one put in its place." A majority of the best bee-keepers in

the country will use no other hive but the Langstroth.

Bee-House.—A bee-house is not necessary. If deemed indispensable, it may be a very cheap structure—a shelter of posts and plank and boards, or a bee-fancier of wealth may render it a highly ornamental and tasteful decoration of his grounds. The last class only, in our judgment, should build bee-houses; for to be useful, they must be expensive—of iron or finely-dressed hard wood, or smooth hydraulic plaster—some material so smooth and so close grained that a miller can find no crevice wherein to deposit her eggs.

QUINBY, in his "Bee-Keeping," recommends that hives stand close to the ground, so that bees coming in on a chilly evening may not drop and be lost. We quote: "I make stands in this way—for a box-hive a board about fifteen inches wide is cut off two feet long; a piece of durable wood two by three inches is nailed on each end. This raises the board just three inches from the earth, and will project in front of the hive some ten inches, making it admirably convenient for the bees to alight upon before entering the hive, when the grass and weeds are kept down, which is but little trouble. A separate stand for each hive is better than to have several on a bench together, as there can then be no communication by the bees running to and fro. If possible, the hives should stand where the wind will have but little effect, especially from the northwest. If no hills or buildings offer a protection, a close, high board fence should be put up for that purpose."

Bee-Moths.—Mr. QUINBY gives the result of his own large experience: "I have been fighting the bee-miller for thirty years, but not directly. I let the bees do most of it. I give attention to strengthening the swarm instead. I have hundreds of hives in apiaries away from home, that are not visited throughout the season to destroy worms. The only particular care is to know which are weak, and watch those—there are always some in large apiaries—and when they can not be strengthened by any means, the next best thing is to remove them and save the contents, and more than that, save the swarm of moths that invariably follow in the weak hive. With this care enforced I have no fear of the moth-worm. The Italians—pure as well as hybrid—resist the moth much more

effectually than the black bees. In large apiaries hives do not seem to be individually troubled as much as in small ones."

One man has little tin doors swinging at the entrance of his hives, which the bees can, and the little brown miller can not, open. Another sets plates of sweetened water, with little tapers burning in the center, around the hives at evening, and thus attracts the millers to their destruction by burning or drowning. The lower edge of the hives should be made sharp, so as not to afford much room for the millers to deposit their eggs. It is also a good plan to raise the hives about one-fourth of an inch from the bottom board by placing little stones or nails under the corners. A moth trap is made by cutting creases upon one side of a shingle or strip of pine board, which is placed with the creases down, under a hive thus raised, so that the millers have free access to run in and deposit their eggs in these creases, and the worms are readily destroyed every evening.

If some such devices are not employed, there is great danger that moths will invade the hive to the peril of its contents.

Surplus Honey-Boxes Needed.—

During the Summer and Autumn months it is important to see that your bees are provided with surplus boxes as fast as they are disposed to fill them. If you have any pieces of clean empty comb, do not commit the egregious folly of melting them up for the sake of the little wax they may contain, but save and fasten them into your honey-boxes. This you may do by dipping one end into melted beeswax; and these combs not only guide the bees, but actually attract them to work sooner than they otherwise would; for, seeing the empty comb, their industrious habits prompt them to fill them with honey.

Does Bee-Keeping Pay?—No, if you don't take care of the bees; yes, if you do. If colonies are cared for, as such industrious, ingenious creatures ought to be, fifty pounds of honey per hive is a low average. A. H. HART writes from Stockbridge, Wisconsin, as follows: "I am somewhat engaged in the bee-culture. I commenced the season, last Spring, with thirty-eight swarms, mostly in the Langstroth hive, and closed the season with one hundred and three swarms. Practiced natural swarming, making all my stocks strong.

"I sold in the Fall twenty-seven swarms for \$179 and got seventeen hundred pounds sur-

plus honey. Sold twelve hundred pounds for \$400, and have seventy-six swarms put for Winter care. What say you to that, you lovers of honey?"

Another writes from central Indiana: "One of my stocks of bees in KIDDER's patent hive, last season, gave me three new swarms, and worked me 25 pounds of surplus honey in the bargain! The first new swarm worked me 96 pounds surplus, of which 24 frames filled was clover, making 64 pounds; 12 frames filled was buckwheat, making 32 pounds. I disposed of the buckwheat honey, both from the old stocks and the new, at 25 cents per pound, amounting to \$14 25 for buckwheat, and the 64 pounds clover at 30 cents, making altogether \$33 45 for honey sold. I estimate my three new swarms, worth \$8 per swarm, making \$24 for increase of bees, and the \$33 45 added for honey, makes \$57 45—deduct \$9 for hives—\$48 45 profits realized from one colony in a single season."

Mr. QUINBY says: "Suppose a person should put in one yard fifty hives, or as many as he could look over in one day, and had seven, eight, or nine yards. At an average of fifty pounds from a hive, there would be an aggregate surplus of from eighteen to twenty thousand pounds. Mr. HAZEN reports five hundred pounds from four hives in one season. At the prices for which honey has been selling for the last few years, a man willing to work would be well paid for his labor; and he *must* work. He must thoroughly understand that not only labor, but energy, care and skill are absolutely essential to success."

Italian Bees.—These have been known for many years in Europe as a variety far superior to the common black honey-bee, being more hardy, gathering a third more honey and breeding a third more bees, and working when so cold that the black ones right alongside would scarcely stir, and actually storing honey while the black were consuming their stores to live. They were introduced to America in 1860, by Messrs. COLVIN and WAGNER of Baltimore, and have since become widely disseminated among the most enthusiastic bee-culturists, both in their purity, through a fertile queen, and as a cross with the black drone.

The superiority of the Italian bee has been attested by LANGSTROTH, QUINBY, HAZEN, FAIRCHILD, KOBLER, DZIERSON, BALDENSTEIN, BUSCH, and the most skillful apiarians of both continents. The Baron of BERLEPSCH, one of the largest bee-culturists of Germany,

confirms from his own experience the statements of DZIERSON having found:

"1. That the Italian bees are less sensitive to cold than the common kind. 2. That their queens are more prolific. 3. That the colonies swarm earlier and more frequently, though of this he has less experience than DZIERSON. 4. That they are less apt to sting. Not only are they less apt, but scarcely are they inclined to sting, though they will do so if intentionally annoyed or irritated. 5. That they are more industrious. Of this fact he had but one Summer's experience, but all the results and indications go to confirm DZIERSON's statements, and satisfy him of the superiority of this kind in every point of view. 6. That they are more disposed to rob than common bees, and more courageous and active in self-defense. They strive on all hands to force their way into colonies of common bees; but when strange bees attack their hives, they fight with great fierceness, and with an incredible adroitness. From one Italian queen sent him by DZIERSON, BERLEPSCH succeeded in obtaining, in the ensuing season, one hundred and thirty-nine fertile young queens, of which number about fifty produced pure Italian progeny."

Mrs. TUPPER writes in the *Iowa Farmer*: "Many fears were experienced on its first introduction that the Italian bee was not hardy, and could not endure our climate. I have found it more hardy than our common bee, wintering well out of doors, working later in the season than the other variety, and venturing abroad in weather when no common bee was seen to leave the hives. It is more prolific also, increasing much faster than the black bee, and, if allowed to do so, swarming earlier and oftener. They continue also to rear young later in the Fall, and thus are prepared to go into winter-quarters strong and populous.

"Through the Summer of 1864, I averaged from my common hives, fifty-six pounds each, the largest yield being ninety-six pounds. I averaged from nine Italian colonies one hundred and nineteen pounds each! The best one of these shows this record in my journal: 'One full swarm taken from it on the 20th of May. One hundred and fifty-six pounds from it in boxes.' The swarm taken from it made eighty pounds, and on the 16th of August threw off a swarm which filled its hive and wintered well. This makes two valuable swarms and two hundred and thirty-six pounds of honey from one colony in a single season.

"As these bees were all wintered alike, in

the same sort of hives, and were managed in the same way, under the same circumstances of season and location, I claim that this result proves beyond a doubt the great superiority of the Italian bee. I attribute this superiority to their greater industry, their energy, and their more rapid increase of young in the Spring, and also their ability to gather honey from the red clover."

Rev. E. L. BRIGGS, of Henry county, Iowa, says in the *Iowa Agricultural Report* for 1865: "I have no doubt but that the introduction of the Italian, or Ligurian honey-bee will produce as much of a revolution in bee-keeping in America as the introduction of fine-wooled sheep, or improved breeds of hogs, cattle, and horses, has in stock-raising among the farmers of our country."

Italianizing Natives.—LANGSTROTH & SON send out, with the fertile Italian queens they sell, the following directions for introducing them to the common hive:

1. Remove the old queen from the colony. Six hours after her removal place the new queen in the wire cage sent with her, closing the end with a sponge or paper wad, and put the cage directly over the frames where the bees are most thickly clustered, leaving off the honey-board. If the weather is cool, or a hive without frames is used, the cage should be placed between two populous ranges of comb. Forty-eight hours after caging the queen, remove the cage, take out the sponge and supply its place with a piece of damp newspaper of single thickness, smeared on both sides with honey or sugar syrup, and tied over the mouth of the cage, and return it to the bees, and they will gnaw through it and liberate the queen. We have devised this method to avoid exciting the queen or bees at the moment of liberation. As royal cells are ordinarily begun before the queen is liberated, and the bees, in strong colonies, often swarm out in the gathering season with the new queen, the hive should be examined about a week after the queen has her liberty, and all such cells destroyed. This examination can never be safely neglected, as even small colonies sometimes prevent the new queen from destroying the royal cells, and she may be killed after one of the young queens has been hatched. Unless otherwise directed in the order, we will clip the queen's wings before shipping, that the apiarian may always know that he has the queen originally introduced, and for his convenience in handling her on her arrival.

2. If their queen is removed some ten days or more before the new queen is to be introduced, so that they have no longer any means of raising queens, and all the royal cells are destroyed, there is next to no risk of losing the new queen.

3. The same result may be secured by keeping the new queen caged in the hive, as directed above, ten days, and then carefully searching for and destroying all the royal cells.

4. Many prefer to put the queen, with the bees accompanying her into a hive containing a frame with bees just hatched and hatching, adding more frames of the same kind from time to time, so as to build up in a few days a good colony. The young bees never hurt the queen. This method requires special care to guard against robbers.

5. When a queen is to be used for breeding other queens, it is a good plan to put her in a small box, holding six or more frames four and three-eighth inches wide by four and five-eighth inches deep, inside measure; from this small hive brood may be taken without the trouble of opening a large colony, and without any cutting of combs, and she can be introduced at the close of the season to a full colony as above directed. With this method it is best to use an entrance ("Langstroth on the Hive and Honey-Bee," p. 174) so adjusted that the queen can not at any time decamp.

For inexperienced bee-keepers we recommend Plan No. 1 as the safest and best mode of introduction. Handle the queen *carefully*.

Facts and Suggestions in Brief.

How to get mice out of a hive: Nail a strip of wire-cloth over the ventilator, and keep them from getting in.

The following is the best way to manage robbing bees: Close the door of the hive five minutes; in this time the robbers will have obtained their loads, and will be pressing to the door. Open it and let them out, and as soon as the hive is emptied of these intruders, close again so nearly that but a single bee can pass at a time. With so small a space the robbers will soon give over, after which open gradually.

Apropos: G. B. TURRELL says in the *Scientific American*: "When it is discovered that two swarms of bees are at war with each other, by turning up the hive containing the attacking bees, thrusting a stick up into the honey and fracturing the comb, you will at once stop all further aggression, and set the bees repairing

the damage done to their own empire, instead of trying to conquer another."

Offer sweetened water to bees, and they will partake freely. After they have filled themselves, you can run your hand among them as much as you please—if you are careful not to injure them—and they will take it all in good part. You may shake them down from their combs over your own person, or that of others, and they will not resent it if you are careful not to breathe upon them.

Some ignorant cities have actually banished bees by ordinance, to keep them from rendering the fruit trees barren by carrying off the pollen. It is well known that these insects are the great fertilizers of plants, carrying pollen, which in many instances, without their aid, would never become distributed.

An excess of drones should be avoided, by discouraging the construction of the cells that produce them. Drones are the "dead-heads" of the hive—the *useless males* in the farmer's herds. The building of drone comb may, to a great extent, be prevented; first, by securing the construction of new combs, in hives containing young queens; and, second, by placing frames to be filled in other hives, near the center. "An ounce of prevention is better than a pound of cure."

FLANDERS' Bee Book advises: "In purchasing bees, select two-year old stocks of large size, that swarmed the previous year. It has been demonstrated that such stocks have young and vigorous queens, and are generally well-conditioned, promising a healthy generation. A very old stock should be rejected, for they will be found of small size and insignificant in number."

Nervous people had better buy their honey; but if they will have bees, let them wear, whenever they go among them, gloves (leather or India rubber, never woolen), and a broad hat with mosquito bar thrown over it and fastened to the shoulders. This will answer in place of a more elaborate bee-hat, with a curtain of wire-cloth.

Fugitive swarms may be stopped, when they fly low, by throwing sand or water among them. Ding-dongs are generally valueless.

For a bee-sting, one drop of ammonia, spirit of hartshorn, will instantly remove the pain of a bee-sting. So will half a tea-spoonful of saleratus water, and sometimes tobacco juice. Mud or water is a relief in the absence of anything better. Always remove the sting as quickly as

possible, and never irritate the wound by the slightest rubbing.

If an angry bee attacks you, never strike at him, or act on the offensive; resentment will bring heavy reinforcements. Stand still, or hold your hands before your face and quietly retreat. LANGSTROTH records two interesting facts: 1, That "a bee at a distance from its hive never volunteers an attack—even if assaulted, it seeks only to escape;" 2, that bee poison produces less and less effect upon the system, and that, after a term of years, the pain becomes very slight.

Bees dislike the offensive odor of sweaty animals, and will not endure impure air from human lungs.

It has been believed that the darker the hive the more content the bees; but LANGSTROTH insists that this is a matter of habit; that they will thrive just as well exposed to the light when they get used to it, and he acts upon his theory in the construction of his observing hives.

FISH CULTURE—METHOD AND PROFITABLENESS.

Farmers are inclined to ridicule the idea of "farming on the water," but if they knew how very easy it is to breed trout and salmon artificially, and what profits are *certain* to result, many of those who have the advantage of running springs would hasten to begin the work of propagation.

Scarcity of Fish.—In almost all our waters east of Chicago, fish are now scarce, where once they disported in abundance. The natural supply is failing. Fish of the most delicious kinds ought to be the cheapest food eaten by man, for no care or expense is bestowed upon their growth; but the numbers have been reduced by the cutting down of shade trees and the pursuit of reckless and imprudent sportsmen, until, in all our midland States, salmon and trout are about as rare as rabbits.

Not only are these scarce in the inland streams, and other equally delicious fish that ought to abound there entirely vanished, but shad seem to be taking a final leave of the rivers confluent to the sea. The stake nets in the Hudson, stretching for hundreds of rods into the channel, do not take more in a day than were formerly taken in nets a quarter or a

fifth of their size. In the Connecticut, Susquehanna, Potomac, James, and Delaware, where drift nets are used, the supply of fish is in like manner decreasing. No more fish can now be taken in a net a hundred yards long than formerly in one of five rods. The same reports come from the South, and unless the fisheries are suspended, or the supply of fish vigorously increased by artificial means, there will soon be no more shad in the market.

Restoration Easy.—When oysters began to disappear, under the increased demand, oyster-beds were established, and artificial propagation has quite restored the former supply, and enriched thousands of enterprising men. These same men stand helpless before the diminution of favorite fish, yet it is easier to restore our fish than it was to restore the oysters.

This is no doubtful experiment; it is a work whose result is certain. Germany has restocked her streams by the method now proposed. The rivers of France were almost entirely exhausted of fish when Louis Napoleon became President, in 1848; since then, through the use of the means which are being adopted in this country, the fisheries of France have been completely restored—in fact, are richer than they were ever known to be before. Canada used to import fish from this country; she restored her rivers by the French system, while we went on exhausting ours by wasteful fishing, and by obstructing and defiling the streams; and we are now, in turn, importing our finest fish from Canada, and paying her fifty cents a pound for the very articles we used to sell her at one-fifth that price. It is proposed to remedy this by restocking our rivers—each State becoming its own fish-farmer.

Origin of Fish Culture.—Fish culture is centuries old in China, but it was reserved among the sacred secrets, and the art never escaped for the use of Europeans. In 1763, JACOBI, a German, discovered and described the method of artificial fecundation, but the art slept soundly seventy-five years thereafter, when it was revived by Professor L. AGASSIZ. As recommended by him, Sir FRANCIS A. MACKENZIE experimented, and thus tells the story: "In the Autumn of 1840, having selected a brook flowing rapidly into the river Ewe, a hollow spot adjoining to it was cleared out, of the following dimensions: Length, twenty-three yards; breadth, from twelve to eighteen feet. All large stones having been removed, the bottom was covered one

foot thick with coarse sand and small gravel—the largest stones probably not exceeding the size of a walnut. A stream from the brook was then led into this hollow, so as to form a pool of about eight inches in depth at the upper, and three feet at the lower end; thus giving it one gentle uniform current over the whole pool, while the supply of water* was regulated by a sluice, so as to have the same depth at all times, and a strong stone wall excluded all eels or trout, so destructive to both spawn and fry.

On November 23d, four pair of salmon were caught and placed in the pool, and were observed to commence spawning on the day following. They were caught carefully, and about twelve hundred ova were gently squeezed from a female into a basin of water, and then they were covered over with an equal quantity of milt pressed from a male fish. The two were stirred about together gently, but well with the fingers, and, after allowing them rest for an hour, the whole was deposited and spread in one of the wicker baskets recommended by Professor AGASSIZ, having about four inches of gravel below and two or three inches of gravel above them.

"On the 19th of February, the ova were examined; life was plainly observed, both where placed artificially and deposited by the salmon themselves. On the 19th of March, the fry had increased in size, and went on gradually increasing, much in proportion to the temperature of the weather.

"On the 22d the eyes were easily visible, and a few of the ova had burst, the young fry having a small watery bladder-like bag attached to the throat.

"On the 18th of April the baskets were all opened. The bags had become detached from their throats; the fry measured about three-quarters of an inch in length, and they swam about easily, all distinctly marked."

Public Fish Culture.—Within the last ten years, the possibility of restocking our rivers has been much studied and debated, and the debaters having found it entirely feasible and easy, considerable has been accomplished in prosecuting the work. To carry it forward systematically requires a concurrence of public and private enterprise; fish commissioners to restock, and legislation to protect the larger rivers, and individual labor in constructing raceways and stocking ponds in private streams.

Legislation.—The legislation necessary to the accomplishment of the work in the several

New England States is now in accord; that of the Middle States has been confined solely to the appointment of commissioners to inquire into the feasibility of the work contemplated. The actual work done in the New England States is also greatly in advance of that accomplished in the Middle States. Destructive fishing with seines, weirs, etc., at the mouth of rivers, has been entirely prohibited, and all other kind of fishing regulated by law. Appropriations have been made for the establishment of suitable hatching-boxes along the upper waters of the rivers, and for building fishways or ladders, by which the natural falls and artificial dams in the rivers may be overcome by the fish who desire to ascend to their natural spawning-beds in the upper and shallow waters of the streams—instinct requiring them to make the cradle of their own young on the very spot where they, themselves, were hatched.

In many cases, these fish-ways are already completed, and the rivers have been largely stocked. One gentleman, Mr. SETH GREEN, of Mumford, New York, in his zeal in the work, deposited in the spawning-beds of the Connecticut 40,000,000 of young shad in a single week in the Summer of 1868, and immense quantities in other streams East and South. These will go to sea, grow fat, and come back by the help of the fish-ladders, which are like stairways, and which the fish rapidly ascend by jumping from step to step, and go to their spawning-beds to lay their eggs, and thus increase the supply of the stream.

What is a Fish-way?—A fish-way or ladder to help fish up over a dam, may be easily described. It should be some fifty or sixty feet long, extending from the dam down stream, with a fall of one foot in ten. It may be five feet deep and eight feet wide, heavily timbered and planked at the bottom and sides, like an ordinary flume. Across the flume diagonally there are several divisions, stopping all the width of it except perhaps one foot. The water is admitted at one corner, by an opening in the dam a foot wide and the depth of the flume. It rushes down and is stopped by the acute angle of the first division, and eddies upward to the opening at the upper corner of it, where it again rushes down some ten or twelve feet into the second angle, and so on in a zigzag course through the flume to the still water below. The flume fills with water, and the current is so slight that a fish of ordinary spirit finds no difficulty in sailing up into the pond. It is believed that, as the result of the measures

taken, shad will soon increase throughout all the Eastern States.

Private Fish Culture.—If any farmer who reads this has an unfailing supply of running water, sufficient in volume to fill a pipe two inches in diameter, he can raise enough fish to feed his whole family, and supply his less enterprising neighbors at prices that will leave him a profit of from three hundred to five hundred per cent. on his investment. And the original investment in money, labor, and knowledge, which is requisite to success as a fish-farmer, is so small as to appear insignificant.

Laying Out Fish Ponds.—The intelligent reader will have no great difficulty in propagating trout in abundance, by following these directions: The first essential is a small quiet brook, that never dries up. If there be no such available, perhaps you can tap a larger stream and draw it thence, or originate one by uniting a number of springs. Then take a month, with team and a hand, any time in Summer, and make a series of oblong ponds on the brook, so that the outflow of one is two to six rods above the inflow of the other. Continue this system of ponds as far as your land extends, or far enough to give a sufficient run of water.

They should be of different sizes, the smallest at or near the spring, being five feet in diameter at the surface and three feet deep, and the other ponds—two or more—doubling in diameter successively, down the stream. This would make the second pond, on the basis we have named, ten feet long, and the third one twenty. These basins should be connected with races also increasing in capacity as the stream descends; the upper one not less than a foot wide and a foot deep, if so much water can be commanded. The ponds should be from four to twelve feet deep, according to their size.

W. F. G. SHANKS, in *Hearth and Home*, further directs as to the construction: "The sides of the races should be made of not less than inch-boards, and the bottom paved with a layer of fine gravel over cobble stones. The bottom of the ponds must be of the natural soil, with an occasional large stone, against which the fish may rub in order to free themselves from the little animals which sometimes trouble them, and a few water-plants to afford shade and hiding places. The ponds and races must be separated from each other by galvanized wire-gratings, to prevent the fish from passing from pond to pond at will or entering the races

at forbidden times. Fish—particularly trout, which farmers will find it most profitable to raise—are such terrible cannibals that they often eat their own young."

When you have the basins completed (permanent) set each side of your stream with sugar-maple trees. Set them about fifteen feet apart in the row, that they may soon shade the stream. At the end of fifteen years every other one should be taken out to give room to the others. This will in time give a fine sugar bush on land that will give the most and richest sap, furnish a cool shade for fish and cattle, and just in the right place where the cattle come to drink. This will make a rough uncouth stream the most beautiful and productive part of the farm, and will add to the value of the farm ten times the cost.

Fish to Stock With.—If there are trout in your stream, you will need no other kinds; they will run into and not much out of your dams. If you have none in your stream, you should be very careful to get the genuine brook trout; you can buy a few pairs of two-year old trout to begin with if you choose. Most farmers buy their eggs already impregnated or their young fish already hatched. There are numbers of pisciculturists who sell trout eggs at ten dollars per thousand, and the young fry at forty dollars per thousand, and forward them to all parts of the country by express.

Trout begin to spawn about the first of November and cease the first of March. SETH GREEN sells spawn and young trout an inch long—mostly between these dates—shipping spawn in moss and young trout in barrels any distance, with instructions how to proceed in maturing them.

Artificial Fecundation.—If you begin with the mature fish, the eggs have to be taken from the fish by hand, or by the use of AINSWORTH'S screens—not patented—strongly recommended by Mr. SHANKS. If you desire to construct the screens, you had better apply to your State Fish Commissioners or to some well-known fish culturist for instruction.

The manual practice is more in vogue. This involves handling the male and female fish in order to impregnate the eggs. A common tinpan only is required, half-full of fresh water from the spring pool. "Take the male fish first, the head firmly in the left hand, the body in the right, but held loosely. The lower part of the body should be submerged, and the body gently stroked or pressed toward the tail by the right hand. The milt—a milky-white substance—

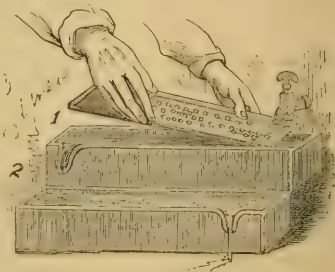
will flow from the fish and discolor the water. Only a little milt is necessary, but too much does no harm. The female is then used in the same way; eggs are extracted instead of milt. In ten minutes the eggs will have become impregnated, and may be put in the hatching-box.* A female trout furnishes more than a thousand eggs. The milt of one male is sufficient to impregnate the spawn of five fish of the same size; fifteen grains of milt will impregnate ten thousand eggs, yet in practice much more is used. A large shad yields about thirty thousand* spawn. When ejected they are round and nearly transparent, and as large as a No. 9 shot.

Dr. THEODORE GILL, in an Essay on Pisciculture in the United States Agricultural Report for 1866, remarks under this head: "It will be seen that the fish should be firmly seized by the hand, and that the other should be passed over the abdomen gently, but firmly, and the ova and milt, if mature, will readily pour out. Only those fishes which are mature should be treated thus. If the ova or milt comes out with difficulty, and only under hard pressure, it is a sufficient indication that they are not ripe, and it would not only injure the pregnant fish, but be useless as to results to anticipate the period of maturity. This uncertainty as to the period when the fish may be most advantageously manipulated, is one of the difficulties incidental to artificial fecundation. The fishes may be caught when they have apparently nearly reached their term, and be confined so as to be under the notice of the pisciculturist. When ripe they may be distinguished by their turgid sides, the pouting anus, and their uneasy movements."

The Hatching Apparatus.—The hatching-box is made in a variety of ways, two imperative conditions being that it be placed beyond the reach of the mature fish, which have a singular appetite for eggs, and that the running water be kept very clean and cool. The in-door apparatus is generally preferred. It must be placed under a partially turned faucet, where it can receive an unintermittent supply. Sometimes two or more boxes are used, the bottom of one resting on the edge of another.

The accompanying drawing shows the troughs best suited for the purpose, each being fitted with a spout, which conducts off the surplus water. The troughs can be multiplied, one above the other, *ad infinitum*. Figure 1 indi-

cates the hands of the operator placing in the frame work of glass rods, upon which the eggs are left to hatch. The lower tank (figure 2) represents the fresh eggs resting upon the gravel. The water from the spout above must be flowing incessantly, but gently. Boards should be fitted on the tops of the troughs while the eggs are being developed. The tanks can be made of zinc, two feet long, five inches wide, four inches deep, with one side of glass. After being deposited in the tank the eggs should not be exposed to the air.



The hatching of trout eggs occupies about seventy days, if the water be of the proper temperature of forty-five degrees; every degree colder or warmer making some five or six days difference in the time of hatching. The young fish should be removed from the hatching apparatus and deposited in the upper pond, entirely cut off from their unnatural parents. When they are two months old they should be fed occasionally with curds, or beef's heart, or liver minutely hashed. Toss this to the fish a little at a time, so that they can catch and devour it before it reaches the bottom of the trough; no more should be given than the fish will eat, because if any is left it will settle on the bottom and foul the water, and the fish will sicken and die.

From the report of the Commissioners for the Restoration of Fish in Massachusetts, we quote: "The little ones will get enough food in a proper pond or brook, if simply left to themselves; but to grow the larger fish rapidly, extra food in large quantities will be required. The way to get this is the way of COMMACHIO; to breed one fish to feed another, and to let the first gain its own living from insects or water-plants. Near the sea-coast vast quantities of little fish may be had for the catching; among which may be named the 'friars,' that swarm in salt-water ditches and creeks. These, scalded

* JAMES WOODAL, of Pennsylvania, estimates it at seventy thousand.

and given to trout, produce a rapid growth, some getting to half a pound and more in a year. There seems no reason why every inland fish-breeding establishment should not hatch, artificially, large quantities of small fish entirely as food for the more valuable trout. Probably the shiners would be the best, because they breed rapidly. A certain amount of beef liver could be used to advantage, but would be too dear and too hard to get for a constant food. The shiners would be kept in small ponds, whence the pickerel and pouts had been removed, and where they would get their own living."

Profits of Fish-Farming.—There is nothing to which farmers near city markets can turn their attention that will pay, on an average, so heavy a percentage of profit as fish-propagation for a few years, at least, and until the normal supply of fish shall be restored, furnishing trout at fifteen cents a pound in market. That it will pay an enormous interest on the investment has been abundantly demonstrated by farmers in almost every State east of Illinois.

Experience of Seth Green.—SETH GREEN, of Mumfords, Monroe county, New York, is the great authority on fish-breeding in America. He has made himself perfectly familiar with the habits of fish; has found his knowledge in personal experience; is a man of unusual skill, originality, and public spirit, and has done more for the development of fish-culture than any other ten men. He has a living faith that our rivers, ponds, and bays may, by artificial breeding, be so filled with fish, that, to use his own words, "the people can't catch 'em all out, if they try." Strong in this confidence, he has given his time and efforts to the propagation of shad in the rivers of the sea-board.

SETH GREEN's experience with his private trout-ponds is suggestive. He was known only as a crack marksman and the best fisherman in central New York, when he bought an old mill site on Caledonia creek for \$2,000, for the purpose of growing trout artificially. He prepared ponds, by simply creating divisions in the old fore-bay and race-way, in which he speedily secured an abundant supply of breeding trout, with which the stream naturally abounded. No sooner had he made these preparations and commenced artificial propagation, than he admitted a partner, who paid him \$6,000 for one-half interest. He has since

constructed ponds, races, hatching-houses, and hatching-boxes for 3,000,000 spawn.

In one of his ponds, only 75 feet long, 12 feet wide, and 5 feet deep, he has 9,000 trout from 9 to 20 inches in length, weighing from a quarter of a pound to three pounds each. Mr. GREEN's profits in 1866 were \$1,000; in 1867 they amounted to \$5,000, and in 1868 he sold 300,000 spawn, at from \$8 to \$10 per 1,000, and 200,000 young fry at from \$30 to \$40 per 1,000, yielding at least \$10,000, besides the profits arising from the sale of full-grown trout from his ponds. The owner has been offered \$20,000 for the farm, and refused to sell it for twice that sum. Four thousand pounds of trout are taken annually from the stream, each rod of which contains by computation, 1,000 fish of all sizes. Mr. GREEN, speaking from his experience, once said that "an acre of good water can be made to produce twice as much food as an acre of land." It was FRANCIS FRANCIS, the first fish farmer of England, who said that a sowing of fish was twice as valuable as a sowing of corn.

Experience of Others.—Dr. THADDEUS NORRIS estimates the annual cost of breeding ten thousand yearling, eight thousand two-year old, and seven thousand three-year old trout at \$706 60; the receipts from the sale of their product, without decreasing the stock on hand, at \$6,100—a net profit of over \$5,000.

Mr. AINSWORTH, of West Bloomfield, New York, found on his farm, when he purchased it, thirteen or fourteen small springs, no one of them of sufficient volume to fill a good-sized quill. But by collecting their several streams into one he secured a volume of one inch of rather variable water—variable not only in temperature, but ingredients; yet he makes this supply of water sufficient for a pond fourteen feet deep, and covering sixty rods of ground—formerly a useless marsh; and in this pond and accessory pools he keeps from fifteen hundred to two thousand trout, which he feeds to his family, and about a dozen farm laborers, and yet manages to sell eggs to the value of at least five hundred dollars a year.

WILLIAM CLIFT, of the *American Agriculturist*, in an address before the Massachusetts Board of Agriculture, in 1868, thus spoke of the ponds of Dr. J. H. SLACK, of Bloomsbury, New Jersey, then established a year: "In one of these ponds he has, as the result of his last year's operations, ten thousand young trout turned out of his hatching-boxes. The fish are

now about six inches long. He has in the next pond about two hundred that are two years old, and in another pond two hundred and fifty fish that were on hand when he began his operations. When I saw him, a few days since, he told me he had taken off forty-seven thousand eggs, which he has in hatching-box, and they are doing very well. He has not lost one per cent. of them, and calculates that when his establishment is fully going, he can raise every year, in that little yard, perhaps about four times the size of this room, fifty thousand pounds of trout, worth at wholesale prices, not less than thirty thousand dollars. It may, perhaps, cost him two or three thousand dollars to carry it on."

A correspondent of the *Springfield Republican* describes the ponds of J. C. BRIDGMAN, of Bellows Falls, Vermont: "Mr. BRIDGMAN is a retired lawyer, living on a farm a little from the center of the village. The numerous springs on his property suggested to him the feasibility of fish-raising as a means to his own gratification; but his experience of only one year has taught him that profit can be combined with pleasure. From seven to twelve beautiful springs come welling up at the base of the mountain where his house stands, and he has converted his 'back-yard' into ponds of 'living water,' the successive ponds being filled with fishes according to size. As 'dogs eat dog,' so trout eat trout—and it is necessary for their safety to keep those of the same age by themselves. A trout will swallow his brother of two-thirds his own size. The ponds are all connected by sluices, which are covered with wire-gauze, for the double purpose of protecting the fish and catching all leaves and sticks. In pond No. 1

are three thousand large trout, from five to twelve inches in length; the pond is no larger than a good-sized parlor, and to see these beauties swimming about would make an old fisherman nervous. They are as tame as gold-fish, and make the prettiest of pets. In all the ponds, some eight in number, are twenty thousand trout, of all ages, from three weeks old to as many years; and Mr. BRIDGMAN expects to have five hundred thousand by another year."

In England and Scotland, entire rivers are farmed for their fish. The Galway, Ireland, was rented in 1852 to a fish-farmer named ASHWORTH, who began to stock it with salmon. In 1853 he took one thousand six hundred and three fish; in 1854, three thousand one hundred and fifty-eight; 1861, eleven thousand and fifty-one, and in 1864, twenty thousand five hundred and twelve—all this without decreasing the original stock. At the same time the same gentleman rented the river Tay for \$40,000 per year; in 1854 he had to pay \$45,000, and in 1864 the rent had advanced to \$75,000. The profits of the fishery were so great that not only was the lessee justified in paying this rent, but he was enabled to build a breeding establishment superior to any outside of France.

Among others who have had much experience, and who may profitably be consulted by beginners, are Colonel JAMES WORRALL, of Harrisburg, Pennsylvania, STEPHEN H. AINSWORTH, of West Bloomfield, New York, and Messrs. TREAT & SON, Eastport, Maine. The *American Fish Culturist*, a volume by THADEUS NORRIS, will also be found a most valuable counsellor.

THE DAIRY:

HOW TO MAKE BUTTER AND CHEESE.—THE FACTORY SYSTEM.

THE dairy has become an important branch of national industry. It is rapidly spreading over new fields, and is engaging the attention of farmers in the Western, Northwestern, and Middle States, wherever the lands are adapted to grazing, and there are springs and streams of living water. The dairy districts, though comparatively limited, embrace a larger area than has been commonly supposed.

It is true, there are extensive plains at the South and Southwest, where the business of dairying can not be carried on, but broad belts and isolated patches of land are scattered over our vast domain, well adapted to grazing, and such lands, when taken in the aggregate, cover a wide extent of territory.

There are two causes that have been operating the past few years to stimulate the development of this branch of industry, and have caused it to assume proportions that give it a distinctive feature of nationality. The first is a large and increasing foreign demand for dairy products; the second is the American system of "associated dairies," now brought to such wonderful perfection that the business can be readily introduced into new sections with all the ease and certainty of success in producing the qualities attained in old dairy districts.

The foreign demand for cheese, it is believed, will be permanent, and exportations from year to year must largely increase, since the finest American grades are acknowledged to be equal to the best manufactured abroad, while the cost of production is so much less as to render competition with European dairies an easy matter on our part. This fact alone gives confidence to those about entering upon the business of dairy farming, that it will be remunerative and enduring.

In addition, as the texture and flavor of cheese have been improved, a large home demand has sprung up, which requires large quantities to meet its wants. It is believed by

many that the home demand, for years to come, will more than keep pace with increased production; and home sales for the last two years would seem to prove that this view is not without foundation.

With a constantly increasing home trade, and a reliable market abroad, no branch of farming to-day offers prospects of better or more permanent remuneration than the dairy.

Overproduction is not likely soon to attack dairymen. ANSON BARTLETT, of Ohio, recently called attention to the fact,* that the relative number of milch cows in the United States, in proportion to the entire population has remained constant for seventy years, being about twenty-seven cows to each one hundred people. The proportion of cows to inhabitants in the older States is steadily decreasing, while the Western States alone show an increasing excess; thus, Massachusetts has twelve cows to each one hundred of the population, while Oregon has one hundred and one, or more than one cow to each person. The production of butter and cheese is not likely soon to outrun the demand.

"The American factory system," says Mr. WILLARD,† now stands pre-eminently in advance of dairy practice in the Old World. By it a more uniform and better product of cheese and butter can be made. These must soon take the lead in European markets, and European nations will adopt the system or be content to see their home products rank as secondary, and sold at inferior prices. Since the adoption of the factory system, a large export trade in cheese has grown up between America and Great Britain. The value of American cheese now sent abroad, is from seven to ten millions

*Essay in Ohio Agricultural Report for 1866.

†X. A. WILLARD, A. M., agricultural editor of the *Utica* (New York) *Herald*, is one of the highest American authorities upon the dairy. We are indebted to him for many of the best suggestions in this article, having drawn freely, not only from his journal, but from his excellent essays in the United States Agricultural Report for 1865 and 1866.

of dollars annually, and as factories improve in the quality of their manufacture, a much larger trade, it is believed, will be inaugurated."

The total production of butter in the United States, in 1850, was 313,345,306 pounds; and in 1860, 469,681,372 pounds. Of cheese, the product in 1850 was 105,535,893 pounds; and in 1860, 103,663,927 pounds, showing an increase in the production of butter, and a decrease of cheese, during that decade. The Western States increased four million pounds in cheese-making; and in butter-making from ninety million to one hundred and sixty-four million. New York made two-thirds as much butter, and twice as much cheese, as the eleven Western States. The production of cheese increased very rapidly and largely after 1860, in consequence of the establishment of cheese factories throughout the country, and a thorough development of the associated system of dairying, known abroad as "the American system."

Mr. WILLARD says: "We have not the exact figures at hand for giving the statistics of butter and cheese made in the Union during the year 1865, but the production of cheese in the Middle and Western States alone, it is believed, was more than 200,000,000 of pounds. From facts gathered by the American Dairymen's Association, it is known that there are now upward of a thousand cheese factories in operation throughout the United States. If the number of cows to each be estimated at 500, we have half a million of cows employed in the associated dairies, and if the average annual yield per cow be put at 300 pounds, we have in the aggregate 150,000,000 pounds. But there are a large number of private or family dairies in operation, especially in the Eastern and Middle States, the production of which, it is believed, will more than make up the estimated annual product of cheese to 200,000,000 pounds. If the value of the cheese product of 1865 be put at an average of fifteen cents per pound, it shows a total of \$30,000,000, while the butter product, if no larger than that of 1860, at the low estimate of twenty-five cents per pound, would amount to over \$114,000,000. In the estimate of the cheese product, it will be proper to remark that the quantity is presumed to be the amount sold, and does not include that consumed in the families of producers."

Advantage of Dairying.—The dairy ought to be more largely introduced at the West, as a prominent department of husbandry. It is less profitable, as a rule, to transport field

crops a long distance, in their crude state, than to transport the same crops after they have been worked over into beef, pork, mutton, butter, cheese, etc. Milch cows are machines to turn grass into gold. A Western Reserve farmer thus talks of the advantages of dairy farming: "I live in the Western Reserve, and in an almost exclusively dairying region, and have seen it change from stock raising and grain growing to what it now is, and the profits of the farms now, are nearly two-fold more than they were under the old system of management. Farmers found that ten to twelve bushels of wheat to the acre, thirty of corn, the same of oats, with attendant expense, such as hired help, seed, extra teams, etc., with the inevitable wear of land, did not pay, but that dairying, with cheese at twelve to sixteen cents per pound, with a little hired labor, and no wear and tiring of one's self, but the reverse does pay, and that well. I do not propose to go into a long argument to prove the advantages and beauties this business has over other branches of farming. I do claim, however, that dairying, in a country adapted to it, is less exhausting to the land, requires one-fourth the manual labor that grain growing does, and yields twice the profit."

English and American Dairying Compared.—Mr. WILLARD visited Great Britain in 1866, commissioned by the American Dairy Association, to investigate English methods. He reports, in the essay already referred to: "The dairy lands of Great Britain, it is believed, are no better than in the best dairy districts of America. Pastures there, it is true, will generally carry more stock than ours, because theirs are freer from weeds and better managed. The yield of hay from permanent meadows is no larger than from our best lands, two tons per acre being considered a good crop, but theirs is composed of a greater variety of grasses, is finer, and doubtless more nutritious than ours, on account of less waste in woody fiber. Their dairy stock is generally no better than in our first-class dairies. I think there is no county in England or Scotland, where the average yield of cheese per cow is so large as in Herkimer county, New York."

He says that, in the management of farms they are far in advance of us; but that in the general process of cheese-making, they are behind us. We quote: "But laying all prejudice aside, I must, in truth say, that we have not yet been able to surpass in excellence the fine specimens of English Cheddar. It is a very high standard of cheese, and is deserving

of all the encomiums which it has received from time to time. The quantity of extra Cheddar made in England is comparatively small, and its peculiar excellence has been rarely reached in American dairies. Its requisites may be briefly summed up in the following points:

1. Mildness and purity of flavor.
2. Quality, which consists of mellowness or richness under the tongue.
3. Long-keeping qualities.
4. Solidity or freedom from eyes or holes.
5. An economical shape as regards shrinkage, handling, and cutting.

"Yet I think I may safely say, that American cheese to-day, as a whole, has more quality and is better manufactured than the bulk of English cheese. I have given them the credit of producing a limited quantity of cheese of the finest type that has ever been reached by any manufacture, but the quantity is comparatively small, and when the whole bulk is considered, there is nothing like the richness and uniformity of that from our factories."

"We come now to consider the two leading defects in American cheese—porosity and bad flavor; and the last may be said to-day to overbalance all the other defects put together, *two or three times over*. I need not waste time upon that character of cheese known as soft, spongy, or salvy, or the poor grades which come from carelessness, inefficiency, or ignorance in manufacture. The English acknowledge that the American factories stand unrivalled as sending out a cheese full of *meat*—that is, full of butter, or rich in quality.

"The causes of bad flavor in cheese are various—in-sufficient and uneven salting; a faulty separation of the whey from the curds before going to press and while pressing; putting the curds to press too hot; high heat and a rapid manipulation of the curds, getting them in press before the proper chemical changes have been effected; but the chief causes of bad flavor in well manufactured cheese, as I saw it abroad, is, in my opinion, due to bad milk, bad rennet, and bad curing of the cheese. If our dairy farmers would only look upon this matter in its proper light, instead of laying all the blame of bad-flavored cheese upon the manufacturer, there would be some hope of improvement. They send to the factory tainted milk and demand from it a perfect cheese. They impose upon the manufacturer conditions which no skill has yet been able to surmount. High skill and great experience in manipulating

milk, together with favorable weather, and the putting the cheese in market, just at the right moment, may enable the manufacturer to counteract, in part, the faults of tainted milk; but with intensely hot weather, and under unfavorable circumstances, it is beyond his art. Bad rennet and tainted milk are prominent causes of the early decay of our cheese."

Western Dairying.—Mr. WILLARD spent some time in the West, in 1868, and he thus reported to the *Utica Herald*, comparing the methods and advantages of the two sections: "It appears that northern Illinois and southern Wisconsin are much better grazing regions than the people of the East have been led to imagine. Timothy, clover, and all the cultivated grasses grow luxuriantly and do well. Springs and streams of living water are not so abundant as in the dairy region of New York, but an unlimited supply of water is obtained from wells of medium depth. In many parts of northern Illinois, by digging down twenty feet, 'sheet water,' as it is called, is reached. The water in these wells is permanent, and as windmills are coming into use for pumping, the herds get a good supply of water without much trouble.

"It is very probable that the great bulk of Western cheese is inferior to first-class New York factory make, but the factories are rapidly improving in their make, and many are producing a quality of cheese that is scarcely inferior to the average good grades of New York. * * * Doubtless the Western farmers are not so well informed as to the manufacture of dairy products as the old and experienced dairymen of the East; but they are earnest, active, and intelligent, and determined not to leave a stone unturned until they have acquired the whole art of manufacturing. They will never rest content until 'their goods' shall be equal in quality and flavor with those of the East.

"The advantages and disadvantages of the two sections may be briefly summed up as follows: We of the East are nearer the sea-board and the English markets; our lands produce more and better grass during the season, 'acre for acre'; we are not so liable to be affected by droughts; we have more streams and springs of living water scattered over pastures and meadows, giving at all times abundance of water to stock at no expense; we have been a long time engaged in the business, and have acquired a reputation in the markets of the

world, which for some time will give our goods a preference in the trade, even if no better than those made at the West. On the other hand the West can make up in the cheapness of the lands any difference of production, acre for acre; the lands West are more easily cultivated; corn fodder, and other forage plants can be raised more cheaply than with us, and these in a measure will supply deficiency in case of drouth; stock can be raised at less expense, and so with all manner of grain and foot crops. They have as yet no diseases among their stock like those that are affecting the herds of New York. The farms generally at the West are much larger than at the East, and the surface being less broken than ours, make them better adapted to machinery. Hence they can be worked at less outlay of labor and expense. They can make a profit on dairy products at prices where it would be a loss to us on our high-priced lands. And thus it will be seen our main props rest on being near market and upon our capacity to improve in making fine goods, keeping ahead of all other sections, and leading the markets."

The price of butter and cheese is fully thirty per cent. lower in the Western markets than in the Eastern, and can be produced at one-half the cost.

Best Cow for the Dairy.—This question is treated at length under the head of Live Stock. We will here only recapitulate: The Shorthorns will average best for milk and the ultimate shambles, if they can be kept on thick grass—"up to their knees in clover." The Ayrshires average lighter on foot, are capable of enduring severe Winters and of recuperating readily in the Spring; moreover they yield a larger quantity of milk and butter, in proportion to the food eaten, than any other breed. The Jerseys (Alderneys) on an average surpass all others in richness of milk and butter, in color, flavor, and texture. The Devons are better adapted to some localities than any other breed, being usually good milkers, while no beef is sweeter. The grades, as of Ayrshire and Shorthorn, or Jersey, are better for some purposes than the pure bloods; while now and then a herd of natives is found to vie with either in dairy qualities. And it is understood that many a poor cow, well-fed and cared for, will produce more than the best cow on half rations.

Feeding.—EVANS, in his "Dairyman's

Manual," thus confirms the methods of cooking, already insisted on, under the appropriate head: "It may be laid down, as a standing fact, that *all roots, bran, shorts, and grain of any kind, that contain much starch, will be greatly improved by boiling or scalding.* The reason is, that starch before entering into the circulation and secretions of the animal system, must first be changed to a condition called *dextrine*—the glutinous substance produced by the house-keeper, when starch is prepared for use in the laundry. Starch, in its granular condition, is quite insoluble in cold water, but when scalded it is perfectly soluble, and enters readily into the circulation. In fact, if starch is eaten raw, this change must be wrought in the animal's stomach by an expenditure of animal heat, before it can be digested; but if it be thus changed by artificial heat before being eaten, the amount of animal heat necessary to produce the change is thus saved, and hence effects a great saving of food; for the amount of food digested is nearly in direct proportion to the amount of animal heat necessary to carry on the vital functions."

What is Milk?—Milk is a yellowish-white opaque liquid, of a sweetish taste, and is a compound of water, butter, curd or casein, sugar, and a little mineral matter. These factors are subject to various changes in form and character; and these changes give rise to the various branches of the dairy.

Milk is a most excellent diet—the very perfection of food. There is nothing like it—it contains curd, which is necessary for the development and formation of muscle; butter, for the production of an adequate supply of fat; sugar, to feed the respiration, and thereby add warmth to the body; the phosphates of lime and magnesia, the peroxide of iron, the chlorides of potassium and soda, with the free soda, required to give solidity and strength to the bone, together with the saline particles so essentially necessary for other parts of the body. It contains lactic acid, or the acid of milk, which chemists inform us is the acid of the gastric juice, so requisite for the proper dissolving of our food in the stomach. It is therefore obvious that milk should be chemically correct in all its constituents, and that its beneficial effects on the constitution should not be neutralized by adulteration. "It is," Dr. PROUT properly states, "the true type of all food."

The oily part, being lighter, rises to the surface in the form of cream. Cream on being

violently shaken at a certain temperature, becomes butter. If a little acid be added to milk warmed to 100° Fahrenheit, it immediately coagulates and separates into two parts, curds and whey. The same effect is produced by the addition of rennet, or sour milk. If sour milk stand for a certain time, fermentation ensues, and an intoxicating liquor results, extensively manufactured by the Arabs from the milk of the camel, called *arrack*.

The following analyses of milk, by different chemists, are copied for the purpose of giving a comparative view of the composition of that of different animals:

	Cow.	Ass.	Goat.	Ewe.
Casein, (pure curd).....	4.48	1.82	4.08	4.50
Butter.....	3.13	0.11	3.32	4.20
Milk sugar.....	4.77	6.08	5.22	5.00
Saline matter.....	0.60	0.34	0.58	0.68
Water.....	87.02	91.65	86.00	85.62
	100.00	100.00	100.00	100.00

The milk of the ass has considerable resemblance to that of woman, the butter being reduced considerably while the sugar is increased in proportion. Milk is secreted by an organ called the mammary gland, the structure and function of which are precisely the same in all animals.

Cooling Milk.—Most milk dairymen feel compelled to resort to methods of cooling milk artificially; for the sooner it is cooled after milking, and the colder it is made, the longer it will keep sweet. Many cool it by setting the cans, as soon as they are filled, into a vat through which runs a stream of cold water, and stirring the milk to hasten the operation. This cools it to about 50° Fahrenheit. It should not be covered close while cooling, or for some time after.

At a meeting of the Western Dairymen's Association, in 1869, Mr. STONE, of McHenry county, Illinois, said it was of the utmost importance that the animal heat be expelled from milk before undertaking to work it into cheese. It should be done before the milk is carried to the factory. Has known it to be injured badly by being carried to the factory immediately after being drawn from the cows. He would put in cans and immerse them in cold water before loading. All cans should be full when carried, or there would be injury from *churning*.

Mr. ELDRIDGE, of Afton, Wisconsin, would not mix the two milkings. No danger of cooling milk too rapidly; would immerse the can of warm milk immediately in cold water, and cool to about 60°. The cans should be left uncovered while cooling. Milk thoroughly

cooled will keep sweet several hours longer than warm milk left to cool of itself. The cans in transporting should not be shut tight unless the milk has been cooled previously. Keep night and morning's milk separate in warm weather.

Others thought it ought to be cooled more slowly, and by hand-stirring.

Mr. WILLARD recently visited the Orange county butter factories, and thus describes the cooling-spring of the Wallkill Creamery Association, which receives the milk from four hundred cows:

There are two springs in the spring-house—one is soft water, and the other happens to be slightly tinctured with iron. Vats are constructed about the springs for holding the water. They are three in number, twelve feet long by six feet wide, set down even with the floor, and with racks in the bottom for holding the cans. The water flows up through these racks and above them to the depth of seventeen inches. The pails are twenty-two inches long and eight inches in diameter, and as fast as the milk is received they are filled within five or six inches of the top, and immediately placed in the water. Care is taken that the surface of the milk in the pails is not above that of the water in the spring. The pails are set close together, and one spring will hold two thousand and forty quarts of milk. The spring should have a sufficient flow of water to divest the milk of the animal heat in less than an hour.

Mr. SLAUGHTER regards 56° as the highest temperature that the water of the spring should be for conducting operations successfully. He has not yet determined the precise temperature of water best adapted for obtaining the most cream from the milk, but is satisfied from his experiments that the natural temperature of the water should not be below 48° nor above 56°. He says more cream, and that of better quality for butter-making, can be obtained by setting the milk on the above plan, than in shallow pans. The object is to expose as little of the surface of the milk to the air as possible, and that surface should always be in a moist atmosphere, in order that the top of the cream may not get dry, which has a tendency to fleck the butter and injure its flavor. The milk of one day is left in the spring until next morning, when it is taken out, the cream dipped off and put immediately in the churns.

In Chester county, Pennsylvania, may be found some of the most complete dairying establishments we have in any part of the coun-

try. The agricultural editor of the *New York World*, in notes of a recent visit there, mentions the following facts with regard to the farm of Mr. S. J. SHARPLESS:

"He keeps from twenty to twenty-five Alderneys, and has what we saw at very few other places, a milking-house; a large and airy structure, with a hard clay floor well rammed, and stanchions, with the name of each animal tastefully printed and nailed over the place where she regularly stands. This house is kept as clean as a dining-room. The cows remain there only during milking time, when a little green corn or other food is thrown in the mangers, so a cheerful entry and quiet standing is insured. Close by stands his milking-house, the walls about ten feet high, six feet being beneath the surface. The floor is covered with oak plank, with a platform or walk raised four inches. Cold spring water stands or rather flows with a depth of about three inches all over the floor. In one place the depth of water is eight or ten inches. Here the great pails of cream stand till churning day. The temperature of the water and of the stone walls which rise from it is fifty-two degrees. When closed, as it generally is, the temperature of the spring-house is about fifty-six degrees, and varies very little whether people outside wear overcoats, or are dropping down with sun-stroke. In fact, we may as well here disclose the grand secret of the Philadelphia butter, for we found the same rule observed at the establishments of JOHN R. PENROSE and of MARSHALL STRODE, who live near Mr. S., and make first-class butter. *From the time the milk leaves the cow till the butter graces the table, milk, cream, and butter are near the temperature of sixty degrees.*"

JOSEPH HARRIS, the accomplished editor of the *Genesee Farmer*, remarks, in a paper on "Butter and Cheese-Making:"

"Casein, or pure curd, is almost identical in composition with the albumen of grass, roots, hay, etc.; with the legumin of peas and beans; with the gluten of wheat, etc.; and with all the so-called protein compounds of oil-cake, bran, linseed, corn, barley, oats, and all substances used as food. These foods also contain oil or butter, as well as starch or sugar; so that we find in milk precisely the same substances as in grass, hay, roots, grains, etc. In view of this fact, some writers have supposed that, by selecting food containing more or less albumen, or oil, or starch, we might, by using the body of the cow as a machine, obtain at pleasure milk containing more or less cheese, butter, and

sugar. So far, the experiments which have been made show this idea erroneous. It is found that substances rich in albuminous matter, and which, according to this idea, should produce milk rich in casein or curd, have precisely the opposite effect, and give milk relatively deficient in casein and rich in butter.

"Milk when drawn from the cow is always alkaline; it contains free soda. Casein or curd is insoluble in pure water, but readily soluble in water containing free soda. It is the soda of the milk, therefore, that keeps the curd in solution. The oil or butter is contained in little bags or films of casein, and is not dissolved, but simply suspended in the water. The sugar and saline matter are of course held in solution. Such is milk when drawn from the cow. By allowing it to cool and remain quiet for a short time, the little bags of butter, being specifically lighter than the other portion of the milk, rise to the surface, and are known as cream. Other changes soon take place. The milk coagulates, and at a warm temperature speedily becomes perceptibly sour. The cause of this is very simple. At a proper temperature, by the absorption of oxygen from the atmosphere, the casein undergoes a slight transformation, and reacts on the sugar of the milk, converting it into lactic (milk) acid. This acid immediately unites with the soda, which holds the curd in solution, neutralizing it, and forming lactate of soda, while the casein being insoluble in water, is precipitated, or, in common parlance, the milk becomes curdled. The conditions favorable to fermentation—heat, light, and moisture—are therefore unfavorable for preserving milk sweet."

Butter-Making.—We can not do better than to quote at some length from the essay of Mr. HARRIS—an excellent authority, living in the midst of a prominent dairy region. We shall insert figures at different points, referring the reader to comments and suggestions which are annexed:

"As we have said, the oil or butter is suspended in milk in small globules surrounded by films of casein. Cream is an aggregation of these oil bags. The object of churning is to separate the oil from the curd by which it is surrounded. This is accomplished by agitating the cream and breaking the films of curd, and setting free the oil which then runs together and forms lumps of butter. Cream, from the formation of lactic acid, is generally sour before churning, and, if not, always becomes so

during the operation. The lactic acid acts on the films of curd and renders them more easily broken. During the progress, the cream increases in temperature from five to ten degrees.

"The best temperature at which to churn the cream is a disputed point. It appears, however, to be well-established by numerous experiments, that fifty-five degrees Fahrenheit, when the cream is put in the churn, and about sixty-five degrees when the butter comes, affords the best results. If higher than this, the butter is white and soft; if lower, the whole of the butter is not separated, and the labor of churning is much increased.⁽¹⁾ In Summer the butter should not come in less than forty minutes. If obtained quicker, it is generally at the expense of color, flavor, and hardness. After the cream is broken, it should be churned slowly until the butter is gathered.⁽²⁾

"Some good butter-makers do not wash the butter at all, but merely work out the buttermilk by pressure. It is said that a better-flavored butter is obtained in this way; but where good, cool spring water can be procured we prefer to wash the butter thoroughly, taking great pains to remove all the buttermilk.⁽³⁾ Butter generally contains about fifteen per cent. of water, curd, etc. It is important for the preservation of the butter that as much of this as possible should be removed. The quantity of salt required depends very much upon the quantity of water remaining in the butter. The water should be saturated with salt, hence the less water the butter retains, the less salt will be required for its perfect preservation.⁽⁴⁾ There are several machines for working butter, but we have had no experience in their use.

"There are various opinions as to the advantage of churning the whole milk or the cream. Some contend that not only is more butter obtained by churning the whole milk, but that it is of better flavor. There is probably a little more butter obtained; but that it is of better quality we may be allowed to question. In the neighborhood of a large city, where, as in Great Britain, buttermilk is in demand, it will pay to churn the whole of the milk; but, as a general thing, it is much less labor and far more convenient to churn only the cream.⁽⁵⁾

"In some of the best English dairies that we are acquainted with, the milk is skimmed every morning; and, sometimes, when a very superior article of butter is required, the cream from the first and second skimmings only is churned—that from the milk, when it is partially or quite sour, being churned separately for

use in the kitchen.⁽⁶⁾ In this country the milk is not skimmed till all the cream has risen, when it is all removed at once. This is probably the better way, for not only is it less labor, but the milk remains sweet much longer than when disturbed every morning by skimming, and this in our hot weather is quite a consideration. It is desirable that the dairy should be cool enough to keep the milk sweet sufficiently long to permit all the cream to rise to the surface, for there can be little doubt that if the milk becomes quite sour or bitter before the cream is removed, the quality of the butter will be impaired. Milk, too, for butter-making purposes should not be placed in deep pans, or all the cream may not have time to reach the surface. For the same reason the pans should be narrower at the bottom than at the top.

"Probably a better quality of butter is obtained by churning the cream before it becomes sour. In hot weather it is almost impossible to do this without churning every morning. A greater length of time is occupied in churning sweet than sour cream, but in hot weather this is no objection. When by fast churning, or any other cause, the butter comes in ten or fifteen minutes, it can hardly fail to be soft, white, and poor flavored. A celebrated butter-maker in this State, who churns every morning in hot weather, has the cream so cold and churns so slowly that the butter is from one to two hours in coming. When the butter is come, it is well washed and salted—six pounds Pacific salt to each one hundred pounds of butter. The next day it is reworked till every particle of buttermilk is removed, when it is packed in tubs, and stored away in a cool cellar.

"The chief points besides cleanliness," says an experienced writer, "in making good butter are these: To milk at regular hours; to place the milk in shallow vessels; to have a perfectly clean cellar, with a hard brick or flag-stone bottom, and with shutters and wire-screen windows to admit air and exclude insects; to skim the milk the moment it coagulates or 'loppers,' which will be in thirty to forty-eight hours; to churn the cream at a temperature between 60° and 65° (in hot weather 55° to 60° is better) by the thermometer; to free the butter as much as possible from buttermilk, and then add a sixteenth part of the purest salt; to work out the remaining buttermilk in twelve hours afterward, and again in twenty-four hours, being careful not to work it too much at a time; to pack it closely in stone jars, till nearly full, and then spread clean white muslin cloth over

the top, pack closely a layer of one inch of fine salt upon the muslin, and finally cover the jar with a neatly-fitting tin cover. This is, substantially, the process of most of the best butter-makers. Butter thus made will keep a year, if placed on the bottom of a cool cellar.'

"Cream always becomes sour in churning, and rises in temperature. This is owing to chemical action—to the conversion of sugar into lactic acid. This increase in temperature, if the cream is cool enough when put into the churn, is probably desirable. But after the cream is well 'broke,' it is frequently necessary to cool it slightly, while the butter is being gathered. This is usually done by pouring in a little cold water, washing down the particles of butter attached to the sides of the churn at the same time. In gathering the butter, it is essential not only to have the buttermilk cool, but to churn quite slowly, or the butter will be soft, and it will be difficult to work out the buttermilk.

"For the attainment of the proper temperature in churning, we consider the 'thermometer churn' one of the best inventions of recent date. It consists of a zinc cylinder, with the lower half encased in a wooden frame lined with zinc, having an inch or two of space between, so that the body of the churn can be surrounded with warm or cold water as desired. There is also a thermometer set in one end, which is of much use as long as it is clean, so that the mercury can be seen.

"KENDALL'S Cylinder Churn is well known, and much esteemed for its cheapness and simplicity. It is an excellent churn, especially for small dairies. Some object to it, and to the "thermometer churn," on account of the corrodibility of the iron at the ends of the axis, which, when much time is occupied in churning, as is frequently the case in late Autumn and Winter, imparts, by the action of the acid buttermilk, a disagreeable color and flavor to the butter. This objection does exist in all churns of this description we have used. Nevertheless, if the joints are properly fitted together, and ordinary care is exercised in keeping them clean and free from rust, little inconvenience will be suffered from this cause. There are those, however, who prefer the old barrel churn, or some of its modifications, as in it all danger in this respect is removed. Some, too, are inclined to go back to first principles, and use the old up-and-down plunge churn. This is very well where a dog-power is used;

or the labor can be much lessened by the simple adjustment of a crank to the dasher."

Comments on the Above.—1.—*Temperature.*—In Winter the temperature of the cream when put into the churn, should be three or four degrees higher than in Summer. The rapidity of churning also has a marked effect upon butter, and also upon the temperature of the cream in the churn; if the cream is at 55° when put in the churn, very fast churning in the Summer will raise it too high, and soft, light-colored butter will be the result; in cold weather the motion should be faster, in order to keep up the proper temperature. If the whole milk be used, the temperature should be about 65° Fahrenheit at commencing. The cream should be brought to the proper temperature in cold weather by warming; in warm weather by cooling with ice or in cold well water—or what is far better yet, let the cream be kept at the proper uniform temperature from the moment it is taken from the cow. A piece of ice in the churn will frequently "bring" perverse butter in the dog-days.

The degrees of heat at which butter can be obtained from cream ranges from 45° to 75°; a moderate quantity of butter, of the *best quality* can be obtained by churning the cream at 51°; the *largest quantity* of butter of a poorer quality results from churning at 60°; while the best yield in quality and quantity is generally produced at the medium temperature of 55°.

2.—"Why don't the butter come?" is a question which is often asked, especially in Winter, and not so easily answered. Perhaps your cows have not been salted regularly while fed on dry food. Perhaps the milk has been kept too cold, so that it has stood too long before it began to change. Some add at the rate of a table-spoonful of good vinegar to four gallons of cream, which often expedites the operation of churning. And others adopt the following method in Winter: "At the time of straining the milk, put in and stir up a spoonful of sour milk, which may be kept in a bowl for the purpose, and set the milk in a moderately warm room, and let it stand without further care till it is ready to be skimmed. When ready to churn, warm the cream to the proper temperature." The butter is apt to be bitter, where the milk has been allowed to freeze and thaw.

3.—*Working.*—There is nothing on which the quality of butter more depends than on freeing it entirely from the buttermilk. Many of the best European dairymen, and good American authorities, like CHARLES L. FLINT, insist that

when the buttermilk is worked out without washing, a more delicate aroma is retained; and this principle is observed in Holstein and Normandy, where a very superior butter is manufactured for the London market. A few of the best dairywomen of America have adopted the practice.

Dr. L. D. MORSE, Corresponding Secretary of the Missouri Agricultural Society, in his report for 1865-6, says: "Soft water is believed to be better for the cows than hard, and is probably much better for use in butter-making. It is customary, at some seasons at least, to add water to the cream in churning, and some wash the butter in cold water. Hard water contains carbonate and sulphate of lime. If butter is immersed in lime water it will become so strong in twenty-four hours as to be unfit to eat, by the action of the alkali upon the butyric acid. For this reason the purest water, which is soft water, must be preferable for use in the process of separating butter from milk, and such pure water every farmer should have, if not in his spring or well, then in his cistern."

From an able agricultural address by J. S. GOULD, we copy the following practical remarks upon the mysterious "knack" of working over butter: "One of the causes of bad butter is the habit which some dairywomen indulge in of leaving their butter unworked for a considerable time after churning. Every hour that the buttermilk remains in contact with the butter, after churning, is an injury; it can not be freed from it too soon.

"The grain of butter is often spoiled by too much working; on the other hand, if it is not worked enough, it will be spoiled—the process, therefore, requires much attention. It is difficult to define with accuracy what we mean by the grain of butter, but every one knows whether butter looks or feels greasy or waxy. When it has the appearance of wax, we say the grain is good, and the more it resembles wax in its consistency the better is the grain. The more greasy in its appearance, the more we say the grain has been injured. In order to free butter from the milk with the least injury to the grain it should be gathered into an egg-shaped form, with a wooden butter-ladle, without touching it with the naked hand; it should then be gashed longitudinally around the whole circumference, making the channels lowest at either end of the transverse axis, so that the milk can run readily away. Pressing the mass together, so that the particles are compelled to slide over each other laterally, as

when putty is worked, and mortar is tempered, must be carefully avoided, under penalty of spoiling the grain.

"It is not easy to work out all the buttermilk at once; it is, therefore, better to set it aside after the first working, in a cool place for twelve hours, during which the action of the salt will liberate more of the buttermilk; the first process should then be repeated, with the same precautions against injury to the grain; it is then ready for packing."

CHARLES L. FLINT says, in *Hearth and Home*: "The hand should never touch the butter after it leaves the churn, as it tends to soften it, and it is not effectual in accomplishing its object in releasing the milk. The best method of getting out the buttermilk, and at the same time working in the salt, is by the use of the butter-worker, which is a marble or hard-wood top table, of circular form, with a groove around the edges to carry off the milk, whey, and curd, and slightly inclined. The butter is placed on the table and there worked by a cylindrical brake, turning on a spiral joint, which flattens out the butter into a thin mass, thoroughly incorporating the salt, and leaving the butter dry and in proper condition for the ball or tub. By the use of this instrument a hundred pounds can be worked in an hour."

The best of the famous "Philadelphia butter" comes from Chester, Lancaster, and Delaware counties. A committee recently visited some of these dairies, and we extract from their description of the dairy of SAMUEL J. SHARPLESS: "Near by the milking house is the 'spring-house,' the institution of this region, about twenty-four feet long and eighteen feet wide, built of stone, with its foundation set deeply in the hill-side, and its floor about four feet below the level of the ground at the down-hill side. The site is that of a plentiful spring, which is allowed to spread over the whole of the enclosed area to a depth of about three inches above the floor of oak laid on sand or gravel. At this height there is an overflow by which the water passes to a tank in an open shed at the down-hill end of the house. On the floor of the spring-house there are raised platforms or walks, to be used in moving about the room, but probably three-quarters of the space is occupied by the slowly-flowing spring water."

The churning is done in a large barrel churn, revolved by horse-power. "In one corner of the spring-house stands the butter-worker, a revolving table about three feet in diameter. The

center of this, for a diameter of twelve inches, is an iron wheel with a row of cogs on the upper side of its rim. From this rim to the raised outer edge, the table (made of wood) slopes downward, so that the buttermilk as worked out is passed into a shallow groove, and is carried away through a pipe which discharges into a pail standing below. Over the sloping part of the table there works a corrugated wooden roller, revolving on a shaft that is supported over the center of the table, and has a small cog-wheel that works in the cogged rim of the center wheel, and causes the table to revolve under the roller, as this is turned by a crank at its outer end. Of course the roller is larger at one end than the other, so as to conform to the slope of the table, and its corrugations are very deep, not less than two inches at the larger end. Supported at each end of the roller and on both sides are bevelled blocks which, as the table revolves, force the butter from each end toward the center of the slope. About twenty pounds of butter is now put on the table, and the roller is turned, each corrugation carrying through a long narrow roll, which is immediately followed by another and another, until the whole table is covered. The roller does not quite touch the table, and there is no actual crushing of the particles. The bevelled blocks slightly bend these rolls and crowd them toward the center of the sloping part, so that when they reach the roller they are broken in fresh places, and by a few revolutions are thoroughly worked in every part."

4.—*Salt*.—MR. WILLARD says: "As to the quantity of salt to be used for butter, something will depend upon its manufacture and the market for which it is intended. The Orange county butter-makers, who obtain the largest prices for their product, use at the rate of a pound and two ounces of salt for a batch of twenty-two pounds of butter. For Winter butter, or butter designed for Winter use, a little more salt is used at the last working. The Government tests of Onondaga salt for preserving meats, and the more recent tests for butter under the superintendence of the New York State Agricultural Society, must show to any unprejudiced mind that as good salt is made at the Onondaga salt works as can be made anywhere. We use this brand of salt in our own dairy, and believe it to be equal to any of the foreign salts." In Chester county, Pennsylvania, they generally use one pound of salt to twenty-four pounds of butter.

5.—*Churning whole milk*, instead of the cream alone, is not a very uncommon practice in this country, and in Europe it is the usual method. Its advantages are that it requires a temperature of 65° instead of 55°, and the former is more easily attained the year round; and the resulting buttermilk is delicious, while from cream-butter it is rarely fit to drink. Where buttermilk is regarded as a luxury, churning whole milk is considered to be quite necessary.

Professor JOHNSON observes that "a hundred gallons of entire milk will give in Summer five per cent. more of butter than the cream from the same milk will yield. Butter of the best quality can be obtained without difficulty Summer and Winter—not only of the best quality while fresh, but also best for long-keeping when properly cured and salted."

The mode to be pursued, where whole milk is to be churned, is to allow the product of two or three milkings to stand till the cream rises to the surface, and then to pour the contents of the vessels containing these milkings, when still sweet, into one large vessel. The whole, cream and milk, is then allowed to remain till it becomes sour and thick. The true degree of sourness is known by a thick, uneven skin formed over the whole mass, and when this is observed it should be immediately churned. In Ireland, this method of butter-making is almost universal.

In Holland, where the whole milk is very generally used for butter-making, repeated stirring is given to the whole mass of milk in order to prevent the cream from rising, and this causes the mass to thicken rapidly. It is kept till it is sour, and till it is thick enough to hold a spoon upright in it. The mass is ready for churning when it will not adhere to the bone or ivory knife stuck into it.

6.—*The Strippings*.—It is well known that the milk last drawn from a cow's udder is far the richest in cream. SCHUBLER says the milk last drawn contains three times as much cream as that first procured. DICKERSON'S Practical Agriculture, asserts that by actual analysis, in one instance, the last cup of milk drawn from the udder was found to contain sixteen times as much cream as the first cup.

The *Western Rural*, inculcating the necessity of milking a cow thoroughly, thus advises: "Shortly after the first flow of milk has ceased, or while the milker is drawing from the other half of the udder, a new accumulation is found in the part first drawn. This will be found

nearly all cream, and when the object is butter-making, this should be drawn into a small vessel by itself, and strained directly into the cream-pot and thoroughly mixed with the cream."

The milk in Spring is supposed to be the best for drinking, and hence it would be best for calves; in Summer it is best suited for cheese, and in Autumn for butter—the butter keeping better than that of the Summer; the cows less frequently milked give richer milk, and consequently more butter. The mornings milk is richer than that of the evening.

Four Interesting Facts.—Dr. ANDERSON furnishes the following maxims in regard to the management of milk:

"1. Of the milk drawn from any cow at one time, that part which comes off at the first is always thinner, and of a poorer quality for making butter than that afterward obtained, and this richness continues to increase progressively to the last drop that can be drawn from the udder.

"2. If milk be put into a dish, and allowed to stand till it throws up cream, the portion of cream rising first to the surface is richer in quality, and greater in quantity, than that which rises in a second equal proportion of time, and so on—the cream progressively declining in quality, and decreasing in quantity, so long as any rises to the surface.

"3. Thick milk always throws up a much smaller proportion of the cream which it contains than milk which is thinner, but the cream is of a richer quality; and, if water be added to that thick milk, it will afford a considerably greater quantity of cream, and consequently more butter, than it would have done if allowed to remain pure; but its quality at the same time is greatly debased.

"4. Milk which is put into a bucket, or other proper vessel, and carried to a considerable distance, so as to be greatly agitated, and in part cooled, before it is put into the milk-pans to settle for cream, never throws up so much, or so rich cream, as if the same milk had been put into the milk-pans directly after it was milked."

French Mode of Butter-Making.

It is well known that cream may be converted into butter by simply being buried in the ground, but it is not generally known that this mode is in common use in Normandy, and some other parts of France. The process is

as follows: The cream is placed in a linen bag of moderate thickness, which is perfectly secured and placed in a hole in the ground, about a foot and a half deep; it is then covered, and left for twenty-five hours. When taken out the cream is very hard, and only requires beating for a short time with a wooden mallet; after which half a glass of water is thrown upon it, which causes the buttermilk to separate from the butter. If the quantity of cream to be converted into butter is large, it is left more than twenty-five hours in the ground. In Winter, when the ground is frozen, the operation is performed in a cellar, the bag being well covered up with sand. Some place the bag containing the cream in another bag, in order to prevent the chance of any taint from the earth. This system saves labor, and it is said to produce a larger amount of butter than churning, and of excellent quality, and is, moreover, said never to fail.

The Devonshire Method.—In Devonshire the method of making butter is peculiar to the county. The milk is placed in tin or earthen pans and twelve hours after milking, these pans (each holding about eleven or twelve quarts) are placed on an iron plate, over a small furnace. The milk is not boiled, but heated until a thick scum arises to the surface; if, when a small portion of this is displaced, bubbles appear, the milk is removed and suffered to cool. The thick part is then taken off the surface, and this is the *clouted cream* of Devonshire, which is celebrated all over England. By a gentle agitation this clouted cream is speedily converted into butter. An English journal remarks that scalding the cream according to the Devonshire method, yields in the shortest time the largest quantity of butter, which, if intended for immediate use, is agreeable to the palate, and readily salable; but if intended to be salted, is more liable to acquire, by keeping, a rancid flavor.

A correspondent of the *Scottish Farmer* affirms that by scalding he can produce fully double the quantity of butter from the same amount of milk. He continues: "My plan is simply this: On receiving the milk I have ready dishes just dipped in boiling water. After straining the milk into these, I place them inside other basins containing a quantity of boiling water. I place them thus in the dairy, at the end of twelve hours renew the boiling water in the outer dish. At the end of thirty-six hours the cream will astonish those who have been accustomed

to the cold basin plan. A friend, to whom I lately showed a large basin of milk, treated in the hot-water way, placed a copper penny piece on the top of the cream, and there it remained comfortably until I removed it sometime after. No Winter cream, after being even forty-eight hours on the milk, could bear the weight of even a silver penny."

Many Americans raise their cream in the same way, setting the basins of milk in larger pans of hot water on the stove until the top becomes "wavy," when it is taken off and left to stand forty-eight hours and then skimmed for the churn. The churn is now set into hot water, and from fifteen to thirty minutes' churning brings the butter. Care should be taken not to let the churn stand too long in hot water as the butter might come soft.

How to Sweeten Rancid Butter.—Rancid butter may be rendered perfectly fresh and sweet by putting from five to ten drops of chloride of lime, per pound of butter, into as much water as will wash the butter when rolled out again and reworked. A greater portion of chloride would not be in any degree injurious, but experience has proved that the quantity stated has precisely the effect desired.

How to Freshen Salt Butter.—Churn the butter with new milk, in the proportion of a pound of butter to a quart of milk. Treat the butter in all respects as if it were fresh. Bad butter may be improved greatly by dissolving it thoroughly in hot water. Let it cool, then skim it off and churn again, adding a small quantity of good salt and sugar. The water should be merely hot enough to melt the butter or it will become oily.

How to make Butter Yellow.—The yolk of an egg well beaten to every two quarts of cream, added just before the termination of the churning will make a very sweet and yellow butter. Any desired shade can be given to Winter butter without in any way injuring the flavor, by grating a carrot (Altringham preferred) into a little milk, and straining it into the cream through a cloth. But carrots fed to the cows give the same result; and they like to do the mixing and coloring themselves. Coloring the cow with a few quarts of yellow-corn meal daily also has been observed to have a marvelous effect on the hue of the butter.

How to Keep Butter in the Summer.—First, make it fit to keep! Then, a simple mode of keeping it in warm weather, where ice is not handy, is to invert a common flower-pot over it, with some water in the dish in which the

butter is laid. The orifice in the flower-pot may be corked or not. It will be still cooler if the cork be wrapped with a wet cloth. The rapid abstraction of heat by external evaporation causes the butter to become hard.

Tin Pails for the Dairy.—Thé Dairymen's Conventions, both East and West, agree in condemning the use of wooden pails, and in recommending the substitution of tin pails. Mr. WILLARD says: "Let the old wooden pail be cast out of the dairy and tin only used for milking and carrying milk. The tin pails should be made with rounded corners at the bottom so as to be readily cleaned. They should be made so as to nicely fit into a wooden pail, which will then serve as a protection to the tin. When arranged in this way the pails will last many years in a dairy, and the time gained in cleansing when compared with the old wooden nuisances, will about pay the cost of the pails the first year."

Packing Tubs.—A most important point to be observed by butter-makers who hope to make a reputation for fine goods, is to pack in suitable tubs or packages. Mr. GOULD, before quoted, says: "I need not tell the dairymen of this country that no packages save oaken tubs are fit for butter, nor that the wood from which they are made should be thoroughly seasoned. They should be prepared by pouring boiling water into them, in which they should soak for twenty-four hours; they are then to be filled with strong brine for two or three days, after which they should be well rubbed with fine salt when they are to receive the butter." The firkins should be of such size that one can be readily filled in a week or ten days with sweet butter, to within half an inch of the head, then place over it a clean cloth, and fill the space with coarse salt, put in the head, then fill with strong brine, previously made of coarse salt, and stop it up. Butter packed in this way and kept in a cool place, will be as sweet in one year as when first made.

Why so Much Bad Butter?—Butter-making is one of the simplest of processes; any intelligent person can comprehend it easily, and there is no "luck" about it; yet more than half of the butter manufactured in America every year—not fit to set before a civilized man—is what Mrs. STOWE calls it, "a hobgoblin bewitchment of cream into loathsome poisons." The first prerequisite to good butter and cheese, is absolute cleanliness. Better keep no cow than to store the milk as many do, in the common kitchen, exposed to its compound of infinite

and disgusting odors—the pans stuck away in a filthy smoky nook,

"Where the goose is a-hatching her eggs all the while, Just under it, right in the corner!"

What wonder that thousands of tons of milk go into cloudy butter, fit for soap-grease, traversed by alternate rivulets of buttermilk, brine, and filth? "Cleanliness is next to godliness"—and, in butter-makers, quite as rare. Mr. WIL-LARD, in a recent address, gave high praise to the English dairymen for the perfect neatness and cleanliness of their dairies. Nothing in English cheese-making struck him with so much force and admiration as the cleanliness in which everything is conducted. The milking is very carefully performed in tin pails. The dairy is located out of the reach of bad odors, or anything likely to taint milk. The milk-rooms have stone floors, the joints of the flagging cemented, so that no slops or decomposed milk can find an entrance. The utensils and everything about the dairy are kept as clean as the table and crockery of the most fastidious housewife. This feature of cleanliness, the speaker said, he found wherever he went, from the Royal Dairy, at Windsor, and radiating from thence all through England. He believed it was this cleanliness and the untainted condition of the milk, together with the even temperature of the curing-rooms, that were the leading causes of the fine flavor which is characteristic of some of the English cheese.

All the utensils—the pails, hair-cloth sieves, milk-dishes, or coolers, tubs, churns, and the butter-prints, should be kept perfectly sweet and clean, put into boiling water for two or three hours, scrubbed, rinsed, and dried every time they are used, otherwise they will have a bad smell and taint the butter.

Cheese.—Hon. HORATIO SEYMOUR, recently President of the American Dairymen's Association, delivered an address upon the subject of cheese. He asserted that "cheese ought to be more generally used in this country. The American people have lost the cheese-eating propensities of their forefathers. Cheese is the cheapest of all articles of food that can be used. Compared with meat, there are very important economies connected with it. It requires no fuel to prepare it. It is more nutritious, and we must look upon it as a substantial article of food. It is not a 'cheap luxury,' it is a cheap necessity." He hoped steps would be taken to present cheese as a common article of food to the favorable consideration of the

poor people of our cities. The attention of our Government should be called to the value of cheese as the food of our armies. There is no article so cheap for soldiers' rations; no article so nutritious; no article so easy of transportation. The Swiss chamois hunters take on their expeditions among the higher Alps, where they remain sometimes for days together, exposed to intense cold and undergoing the hardest of exercise, only a small quantity of cheese and a flask of brandy. The English harvesters live on ale, cheese, bread, and occasionally a bit of mutton.

Process of Cheese-Making.—Again we have recourse to the essay of Mr. HARRIS: "Milk can be instantly curdled by the addition of an acid, and, in some countries, spirits of salts (hydrochloric acid), and vinegar (acetic acid), are used instead of rennet for 'setting the cheese.' Cheese so made, however, is harsh and unpalatable.

"The only way to make good cheese, is to produce lactic acid from the sugar of milk by fermentation. A great variety of means are employed for this purpose. As we have said, the casein in milk will of itself change the sugar into lactic acid, and curdle the milk; but, before it does this, it has itself begun to ferment, under the influence of light and heat, and by the absorption of oxygen from the air. If curd be exposed to the atmosphere for a few days, and then be added to milk, it coagulates it as quickly as rennet, and is often used for this purpose. A number of vegetable substances, such as the juice of the fig or thistle, are also used as rennet. All animal substances, in a state of decomposition, will convert the sugar of milk into lactic acid; but, although pig's bladder is still used in some countries in Europe, it is generally conceded that the stomach of the calf, properly prepared, is the best substance for this purpose.

"When fresh, the membrane of the calf's stomach is insoluble in water, but when it is salted, and kept for several months exposed to the air, a portion of its surface is decomposed and becomes soluble. It is this soluble, decomposed, or, more properly, decomposing membrane, which is the active principle in rennet. It is a soluble, highly nitrogenous substance, having its elements in a disturbed state, and therefore highly effective in inducing change in the elements of other bodies with which it is brought in contact.

"In preparing rennet, we have to check the

natural decomposition of the stomach by the use of salt, otherwise it would communicate an unpleasant flavor to the cheese; but, at the same time, keep the salted stomach long enough to permit its elements to become disturbed by the action of the atmosphere. In Cheshire, England, the skins are cleaned out and packed away with salt in an earthen jar till the following year. They are taken out a month before use, stretched on pine sticks and dried. A square inch of the skin, for each fifteen or twenty gallons of milk, is soaked for twenty-four hours in a solution of lukewarm water and salt, and the whole poured into the milk and well stirred.

"In Ayrshire, the contents of the stomach are preserved; they are well salted, both inside and out, and dried for a year or more; and, when needed for use, the whole is chopped up and placed with salt in a jar, along with water and new whey, which, after two or three days, is strained to remove impurities, and is then ready for use. In the dairy districts of New York State, the stomach is emptied of its contents, salted and dried, without scraping or rinsing, and kept for one year. It is soaked for twenty-four hours in tepid water—a gallon to each rennet. They should be frequently pressed and rubbed to get out all the strength.

"The liquor containing the soluble rennet is then saturated with salt, allowed to settle, and strained to remove the sediment and impurities. It is now fit for use. It should be kept in a stone jar, and in a cool place. As much of the liquor is used each morning as will set the cheese firm in forty minutes. We have visited many excellent English dairies where the same system is adopted. It is, in our opinion, better than placing the rennet itself in the milk. The stomach may again be salted, stretched, and exposed to the air for some months, when it can be used over again—a fresh portion of the membrane having been decomposed by the air and rendered soluble. This fact, and others that might be mentioned, sufficiently prove that it is not the *gastric juice* of the stomach that is the active ingredient of rennet in coagulating milk.

"As cheese-making is a fermenting process, it is influenced materially by heat, proceeding within certain limits, faster or slower as the temperature is raised or lowered. In England, the milk is generally raised to a temperature of 85° Fahrenheit, before adding the rennet. In this country it is set cooler, and raised to a

higher temperature after the milk is coagulated. This is called 'scalding.' The word is a bad one, calculated to mislead. To '*scald the curd*,' would be to spoil the cheese; but all that is meant by the phrase is raising the temperature of the whey and curd up to about 100° Fahrenheit. This 'scalding' process has many advantages; among others, the cheese requires less pressure, and the milk can be set at a much lower temperature—say 80° Fahrenheit.

"Scalding should be done with great care and nicety. Formerly it was done by heating a portion of whey, and pouring it into the cheese; but there is danger of injuring a portion of the cheese by overheating it. A much better method is now generally adopted by the dairy-men in the northern counties of New York, and it is one of the greatest improvements in cheese-making we have seen. What our English friends call the 'cheese tub,' is made of tin, and is placed in a wooden frame, so fixed that it can be surrounded by hot or cold water as desired. The evening's milk is strained into this tin, as it is brought in warm from the cows; and is kept cool by allowing cold water to run around it. The morning's milk is added to the cooled evening's milk, and if not then sufficiently warm to add the rennet, warm water is poured round the tin till the proper temperature is attained. There is some difference of opinion on this point; we know good dairy-men who add the rennet to the milk at 80°, and others not until it is as high as 90°. The curd should come in about forty minutes. Shortly afterward the curd is cut up with a 'cheese-breaker,' and then the temperature is gradually raised by pouring warm water around the tin. Many err by raising the temperature too fast. It should not be increased more than a degree in five minutes.

"The English method of separating the whey from the curd, by allowing it to settle, and dipping off the whey, is too slow for an intelligent go-ahead American. A lattice frame-work, on which a large cloth is spread, is fitted into a sink, connected by a pipe with the receptacle for the whey, or pig cistern. The whey and curd are dipped on to this cloth, the whey running through in a few minutes, leaving the curd on the cloth. A little cold water is then poured on to the curd to keep it from packing. Some, however, prefer to cool the whey and curd together, by putting cold water round the tin. When the whey has all drained away, the curd is broken up fine and salted. It is then placed

in a cheese hoop and pressed for twenty-four hours."

Of the large number of excellent cheese presses on the market, Mr. HARRIS mentions as among the best, DICK'S, KENDALL'S, and the Self-acting Press.

Cheshire dairymen, as a general thing, do not scald their curd, and hence much more care is needed in salting and pressing than in the process we have described. After the curd is separated from the whey, it is put under a hand press for an hour or two, and as much of the whey expressed from it as possible *previous to salting*. When taken from under the hand press, it is broken quite fine by hand, and salted. It is then put in the cheese hoop, and pressed slightly for six or eight hours. It is then taken from under the press, pierced with a wooden skewer, in order to open channels for the exudation of the whey, covered with a clean cloth, and put under a heavy pressure till next morning, when a clean cloth is again put round it, and a heavy pressure applied till it will no longer wet the cloth. Cheeses are frequently left under the press three or four days. "Scalding" expels the whey from the curd more effectually than can be done by the most powerful and long-continued pressure, but it is a question whether at the same time it does not destroy some of the desired flavor of the cheese. If our dairymen should "scald" less and press more, their cheese would be more highly prized, at least in the English market.

The Cheddar Process.—The celebrated Cheddar cheese is regarded by Englishmen as the finest made in the world; and American authorities confirm this high estimate. Mr. WILLARD says, in studying the cause of this superiority, that it is referable to the uniform cleanliness of the English dairies, more than to anything else. "There is nothing, perhaps," he continues, "which indicates the progress and skill of our manufacturers more than the fact that they are able to take imperfect milk from the hands of patrons, manipulate it among the fetid odors of whey slops and decomposed milk, and yet turn out a cheese that will compete with the great bulk of English make. But these conditions will not and *can not* produce the fine, delicate flavor of the best Cheddar, and it is one reason why there is such a great bulk of American cheese condemned abroad as 'not just right in flavor.' Now this putrid inoculation does not show its whole character at first, but, like an insidious poison in the blood, increases from

week to week, until it puts on a distinctive feature which spoils all the good material with which it comes in contact. I saw American cheese abroad, perfect in shape and color, rich in quality, splendidly manufactured, and having a bright, handsome appearance, that would have placed it on an equality with the best in the world; but the trier showed a flavor that could be plainly traced to a bad or imperfect condition of the milk before manipulation. I have been extremely mortified, while testing cheese abroad, to catch the taste and smell of putrid rennet and of the stables. This is one point of difference between the dairy practice of the two nations.

"In the Cheddar process the milk is at a low temperature, from 78° to 80° using some whey with the rennet, according to the condition of the milk. After coagulation is perfected, which takes from forty to sixty minutes, the curd is cut in large checks, and soon after they commence breaking with a wire breaker attached to a long handle. The breaking is at first slow and gentle, and is continued till the curd is minutely divided. This is effected before any additional heat is applied. They claim that the curd can not be properly broken at 90° or above 90°, and that there is a better separation of the whey and condition of the curd by minutely breaking at about 75° or 80°, without an increase of heat during the process. This process of minute breaking in the early stages of the curd, appeared to me to result in loss of butter, and this is the chief reason, I think, why Cheddars have less butter in their composition than our best American. The breaking usually occupied a full hour. The heat is raised, in scalding, to 100°. There is a wide difference in the treatment of the curds.

"When the curd has reached a firm consistency, and the whey shows a slightly acid change—a change so slight as to be detected only by the experienced observer—it is immediately drawn and the curd heaped up in the bottom of the tub. I am not sure but that this early drawing of the whey is an improvement.

"Soon after the whey is drawn and the curd heaped, it is cut across in pieces a foot or more square, and thrown again in a heap to facilitate drainage and develop further acidity. It remains in this condition for half an hour, the whey meanwhile flowing slowly from the heap, when it is taken out of the cheese tub and placed in the sink or cooler. It is then split

by the hand into thin flakes and spread out to cool. The curd at this stage has a distinctly acid smell, and is slightly sour to the taste. It is left here to cool for fifteen minutes, when it is turned over and left for the same length of time, or until it has the peculiar mellow and flaky feel desired. It is then gathered up and put to press for ten minutes, when it is taken out, ground in a curd-mill, and salted at the rate of two pounds salt to the cwt. (112 pounds) of curd. It then goes to press, and is kept under pressure two or three days. The curd, when it goes to press, has a temperature of from 60° to 65°, and when in the sink it is preferred not to get below this point. A proper temperature is retained in the curd during the various parts of the process, in cool weather by throwing over a thick cloth. It will be seen that, the whey being disposed of at an early stage, the attention of the manufacturer is to be directed only to one substance—the curd. By draining the whey and expelling it under the press, and then grinding, a uniform incorporation of this material is effected. The cooling of the curd before going to press, and the removal of the cheese, after pressure, to a cheese-room, where an even temperature is kept up, differing but little from that of the cheese when taken from the press, effects a gradual transformation of the parts into that compact, mellow, flaky condition which is characteristic of the Cheddar, and at the same time preserves its milky or nutty flavor."

In London, small Cheddarsizes of forty, fifty, sixty, and seventy pounds are popular, and will command an extra price over cheese of large size of the same quality. The true Cheddar shape is fifteen and a half inches in diameter by twelve inches in height, and by preserving this proportion for larger or smaller cheese that style is obtained. Cheddars are made varying in size from those named up to eighty and one hundred pounds, but the larger are not so common.

The Factory System.—In 1859 there were only four cheese factories in the State of New York; in 1867 there were 500; in 1869 the number is estimated at 800! Tributary to these, were at least 400 cows to each; and their total product in 1867, was 40,000,000 pounds of cheese. Under this system of association the farmers bring their milk and pay for having it worked up. We extract from Mr. WILLARD again:

"The cost of manufacturing cheese is, to the

farmer, one cent per pound, rennet, salt, bandage, annatto, and boxes, as well as carting the cheese to market, being charged to the association and paid by each dairyman in proportion to the quantity of milk furnished during the season. The whey, as has been before observed, belongs to the factory. All other expenses, including the care of the cheese while curing, etc., is paid by the manufacturer.

"To run a factory using the milk of 600 cows will give constant employment to at least four persons, half or more of whom may be females. Before the war, when prices had not become inflated, the actual cost of manufacturing the milk from 600 cows was about \$700 for the season. This sum does not cover interest on capital invested for buildings and fixtures, but was the amount paid for labor, board, fuel, etc.

"From these data it will be easily estimated what amount of money can be realized from the business of manufacturing. Allowing that the 600 cows produce, on an average, 400 pounds of cheese each, there will be in the aggregate 240,000 pounds. The cost of a well-constructed factory will not be far from \$3,000.

We have then 240,000 pounds at one cent.....	\$2,400
Cost of running factory	\$700
Interest on buildings, etc.....	250
Annual wear and tear, or depreciation of property	200
	<u>1,150</u>
Profits.....	\$1,250

Now, for 300 cows, nearly the same expense would be incurred, and the factory account would stand thus:

120,000 pounds of cheese, at one cent.....	\$1,200
Expense of running factory.....	\$700
Interest on capital invested.....	250
Annual depreciation of property.....	200
	<u>1,150</u>
Profits.....	\$90

"We do not pretend to give the exact figures in the above estimate, but it will be seen that a factory manufacturing the milk of a less number than 300 cows will not be a very paying business, unless the manufacturer can have most of the work performed by members of his own family." There are now no less than sixty cheese factories in Ohio.

Important Factory Statistics.—At a recent meeting of the New York State Cheese Manufacturers' Association, in Utica, interesting and valuable statistics were presented from a considerable number of factories in different localities. The returns from twenty-five of these factories were complete, on the four points embraced in the subjoined table. These figures

illustrate the extensive business now done in making cheese, on the factory system:

NAME OF FACTORY, AND COUNTY OF LOCATION.	Average No. of Cows	Amount of curd made, in pounds.	Av. price per lb. in curd and fractions.	Av. lbs. milk required for 1 lb. of curd.
Holmesville factory, Chenango	300	114,246	20.62	9.90
Miller's, Lewis	350	18,411	22.77	9.51
Collins', Erie	871	249,048	20.73	9.82
Hawleyton, Broome	265	18,000	21.80	
Coal Creek, Herkimer	475	176,000	18.80	10.00
Stevens', Lewis	750	207,121	21.60	10.16
Charleston, Montgomery	335	98,101	22.25	9.84
Nelson, Madison	375	199,884	19.69	9.78
West Schuyler, Herkimer	550	190,916	21.90	9.71
Springfield, Oswego	300	157,806	21.29	9.97
Mill Strip, Madison	360	122,105	21.14	9.85
West Exeter, Oswego	500	172,894	21.75	10.07
Brookfield, Madison	200	64,969	24.25	8.31
Orwell, Oswego	250	74,557	21.70	10.00
North Litchfield, Herkimer	375	127,275	21.70	9.90
Deansville, Oneida	275	83,094	21.33	10.38
Brookfield and Mary, Onida	100	157,806	21.29	10.26
Stanley's, Jefferson	400	121,050	18.80	9.50
Scriba, Oswego	400	100,744	20.00	9.25
East Berkshire, Franklin	500	101,339	21.00	10.00
Indiana Lake, Madison	270	55,422	21.12	10.20
Ingraham & Hustis, Jefferson	600	142,518	23.09	9.95
Gilbert's, Oswego	350	110,465	18.97	10.01
McLean, Tompkins	337	302,804	22.25	9.10
Whitestown, Oneida	600	204,025	22.70	10.05

Total number of cows reported, 12,120.

Total pounds of cheese made, 3,720,399.

Average lbs. of cheese for each cow (nearly), 308½.

Average lbs. milk to 1 lb. of curd cheese, for 24 factories, 9.85.

The largest average number of lbs. of cheese for each cow, is that reported by the Springfield Center factory, Oswego county, 459 lbs.

The next largest, by the Coal Creek factory, Herkimer county, 370 lbs.

The smallest number lbs. milk, per lb. of curd cheese, reported by Elliston's Brookfield factory, Madison county, 8.31.

The next smallest, by Whittemore's Scriba factory, Oswego county, 9.35.

Aggregate sales of the 25 factories, at an average of 21 cents, 4 mills per lb. \$795,979 37.

Average sales of each factory, 148,816 lbs., \$31,639 18.

It will be observed that the weights of cheese made, as above given, are those of *cured cheese*. Five factories give the weight of the cheese when *green*, as well as when cured, and as this illustrates the shrinkage before marketing, we give the aggregate, as follows: These five factories manufactured 719,759 pounds, weighed in its green state, or 679,872 pounds, weighed when cured—a loss of 39,887 pounds, or about 5.54 pounds in the hundred. The average sizes of the cheese made are given by nearly all the factories—the greater number running at about one hundred pounds each, and three at about one hundred and fifty pounds.

Making on a Small Scale.—A Maine paper, gives the following account of a new process of making cheese, which promises well where only one or two cows are kept, as it has been "repeatedly tried with flattering success." The milk is set in the ordinary way every morning, and the curd is separated from the whey as well as it can be with the hands. It is then pressed compactly into the bottom of

an earthen (or stone) pot, and covered over with several folds of dry linen or cotton cloth. By this process the remaining whey is absorbed, and when the cloth becomes saturated, it is removed, and a dry one placed in its stead. In the course of a day and night the whey is removed as effectually as it could be done by pressing. The next morning the milk is prepared in the same manner, and the curd is packed closely upon the top of that prepared the day previous, and the same method pursued in separating the moisture. This process is to be repeated till you have a cream-pot full of cheese. The labor is much less than in the old method, and the care of it afterward comparatively nothing.

Here is another method, practiced where one or two cows are kept: "Take cool weather, either in Spring or Fall, when milk and cream will keep, and when flies are scarce. Strain your milk in some deep vessel, that will hold two milkings, in the morning skim slightly; warm the milk to blood heat, add the water which has soaked a bit of rennet about two inches square over night, and as soon as stiff cut with a carving or other knife; let it stand a few minutes, when you can put it into a cloth strainer, and lay by until you accumulate as large a curd as your hoop will hold, when you chop the whole, scalding with hot whey, just so it will give a creaking sound if chewed. Then add a little salt, sage, or whatever you like, and press. The whole operation need not require over an hour's time."

D. C. SCOFIELD writes to the *Western Farmer*: "Cheese is now being manufactured in the city of Elgin, Illinois, on a principle which promises to give a reputation for excellence hitherto unknown. By this new method the whey and watery substances are entirely extracted from the curd, before it is subjected to the press, retaining the entire richness of the cheese, and rendering it so pure that it will keep unchanged for years. The process is by placing the curd, when prepared for the press in the ordinary way, into a wire-screen hoop, which is placed horizontally and set in motion of about one hundred and fifty circuits or revolutions in a minute."

It would seem practicable and profitable for the dairymen of each State or section to unite in employing an agent in New York for the sale of their products intended for export or otherwise, instead of trusting to the present hap-hazard way of reaching the consumer.

ARCHITECTURE OF THE HOMESTEAD:

HOUSES, BARNS, AND FENCES.

FARMERS are, as a rule, miserably lodged. A majority of our rural habitations are uncouth and outlandish in the extreme, showing little evidence of good taste or refinement in the occupants—the whole group of home buildings bearing an aspect of dreariness and incongruity. Architecture is almost entirely unknown in this country beyond the city limits, unless the gratifying improvement in the public school buildings that has taken place within fifteen years, may be said to furnish an exception.

In this matter of building attractively, farmers are really the most independent men in the world; for, while they have not always a large sum of ready money in hand, they can generally furnish much of their own stone and lumber, do much of the work, and so build at a reduced cost. By bestowing some degree of simple ornament on their residences, they can make themselves more comfortable and their sons more contented to follow the ancestral calling. Beauty is a sort of physical morality, and the farmer who ignores or despises it, and is willing to drag out his days in a clumsy, ill-contrived dwelling, runs the risk of becoming a worse neighbor and father than if he had pleasanter surroundings.

We do not intend to urge or suggest extravagance in this matter; economy is quite as needful here as elsewhere. It is only our purpose to deprecate the prevalent lack of refined taste in this department of farm life, and to call attention to the fact that a *handsome house can be built as cheaply as a deformed and repulsive house*. A residence may be rude, yet neat and shapely; it may be very plain, yet very attractive. This fact does not seem to be understood in our rural districts.

"Joiners," who have served an apprenticeship at the jack-plane, so brief that it would hardly qualify them to build a barn in England, are called upon to erect many of our largest and most complicated farm-houses. "Build

mine like neighbor SMITH's," are their instructions; "only put a window in *here*, and swing that room around *so*, and cut a door through *there*." So the hybrid houses are multiplied, and comeliness and symmetry retreat into the unhewn woods.

This chapter will give some hints in regard to style, but the general theme of farm architecture must of course be very inadequately treated in the few pages at our command. We advise those who can, to look at some standard work before building, such as DOWNING'S Cottage Residences, WHEELER'S Rural Homes, or SLOAN'S Homestead Architecture; while all who contemplate a residence of much pretensions should also consult a reliable architect. The cost of such professional advice is a matter to be considered, and of this DOWNING says: "Many persons within our knowledge have been deterred from applying to a professional man for advice in building a house, or laying out their grounds, from a mistaken idea of the enormous charges to which they would be subjected. In the hope of lessening this error we have applied to one of our ablest architects, for a general list of professional terms, an extract from which we shall here offer:

"Design for a gate lodge or small cottage, \$50.

"Design for a church, \$100.

"Design for a villa residence of moderate size, \$50 to \$100.

"Design for a villa of the first class (estimated at \$15,000), including a visit to the site, \$150.

"The foregoing are exclusive of the *working drawings*.

"For five per cent. on the estimate of the whole cost at New York prices, the architect furnishes the design, including the elevations, sections, and working drawings, a complete list of specifications, procures an estimate, and gives an occasional superintendence while the building is in progress."

This estimate was made twenty years ago, but we learn, upon inquiry, that the average charges are about the same to-day.

Style of Architecture.—This should be adapted to an American landscape, and some of the neat and attractive composites scattered here and there through our States, are preferable for this purpose to any feudal importations. DOWNING, ALLEN, and others agree that there is little place on this continent for the massive ancient orders; the Doric, Ionic, Grecian, Tuscan, Egyptian; that these are superseded by the lighter styles whose characteristic is elegant variety; modifications of the Italian and Swiss, with projecting roofs and balconies, the rural Gothic, with its sylvan arches and pointed gables, the animated French with its broken Mansard-roof and its airy aspect, or the Anglo-American cottage, with its neatness and modesty, which fit it to a quiet landscape. These graceful forms will better adorn the hill-sides of America than anything more ostentatious. We earnestly second the suggestion of DOWNING: "For domestic architecture, we would strongly recommend those simple modifications of architectural styles, where the beauty grows out of the enrichment of some useful or elegant features of the house as the windows or verandas, rather than those where some strongly marked features of little domestic beauty overpower the rest of the building."

The style of architecture should also depend much on the location. The Swiss chalet seems most at home when it hangs like a bird's nest in a gorge or on a mountain-side; a wooded vista should lie below the Italian balcony, the piquant Gothic should have rugged and rustic surroundings, always including evergreen-trees that shoot up higher than the building. For an open plain, there is nothing like a simple winged mansion, or an adapted English cottage, suggestive of repose. How often we see these essential conditions inverted, and beauty wasted for want of harmony!

Farmers who aim at magnificence in building, generally make wretched failures. Imitations of the castellated mansions of Europe, if not ridiculous while occupied by the builder, always become so within a generation; for property is not entailed. Convenience, durability, utility, harmony—qualities which may be summed up in the word *expression*—should govern absolutely in forming an American home.

Suggestions for Builders.—

The Site.—The relative position of the house on the farm is a matter of much importance. *Fitness* is the first consideration. The residence need not necessarily be located on the highest hill, though the ground should decline on all sides.

"The house," says ALLEN, "should so stand as to present an agreeable aspect from the main points at which it is seen, or the thoroughfares by which it is approached. It should have an unmistakable front, sides, and rear; and the uses to which its various parts are applied should distinctly appear in its outward character. If a site on the estate command a prospect of singular beauty, other things equal, the dwelling should embrace it; if the luxury of a stream, or a sheet of water in repose, present itself, it should, if possible, be enjoyed; if the shade and protection of a grove be near, its benefits should be included."

"In England," says WHEELER, in *Rural Homes*, "it is very common to face the building, not due north and south, east and west, but to place it diagonally, so that the sun shall, in a greater or less degree, have access to each side of the house. This plan has advantages, which recommend its adoption in some cases here. Although the southern side of the house has, in warm weather, the sun upon its front for a longer portion of the day than any other, it is nevertheless the most desirable for occupancy. A breeze almost always, even in the hottest sunshine, rustles from the south, and the even, steady light, although bright and accompanied with heat, is cheerful. Properly contrived blinds will screen the sun, and due regard to the position of doors, windows, and ventilating valves, will secure a constant change of air within the rooms.

"As a general rule, the entrance hall should not open toward the north, but toward the east, south, or west; if, however, any local peculiarity compels the necessity of the northern side being chosen, take care that the hall door is screened by a porch, closed toward the north, and open through on the two sides, as then, though the door be thrown back, the entrance of the cold air will be prevented."

The Surroundings.—In this country, the houses all seem to huddle upon the road. This habit, which resulted at first, perhaps from the unprotected and lonely condition of the early settlers, is perpetuated by the gregarious character of our people. We crowd down upon the highway, that we may "see folks." This

tends to disquiet, while it sacrifices the inexpensive beauty which a farm-house borrows from a spacious and well-kept lawn in its front. Moreover, a good house standing ten rods from the highway, with a pleasant grass plot intervening, will almost always sell at a higher price, and more readily, than a house precisely similar, located immediately upon the road.

Another thing: no country house is fit to live in if it have not trees near it—the larger the better. We would rather occupy a cabin embowered in trees and evergreens, than such a stately mansion as we have seen, standing high and dry on a naked hill, freezing in Winter and broiling in Summer, looking as desolate as if it had been blown there by some malevolent hurricane.

But trees should not be *too* near; when standing so as to overshadow the house, they create an unwholesome dampness, not only injuring the walls, and roof, and making the cistern water impure, but impairing the health of the occupants. *Close* to the house, trees are pernicious; at a little distance, they are wholesome, ornamental, and desirable. They should never be near enough to intercept the rays of the sun; there is no more important curative agent, and some sunshine should be introduced, every day of the year, into as many rooms as possible. Small lattice-work before the door and around the windows, for creeping vines, add much to value and beauty. A neat, pleasant-looking place is always salable. Horticulture, especially that phase of it which decorates the lawn, is the poetry of farming, and it is a poetry that returns compound interest.

The Shape.—A curve is the line of beauty; but, in architecture, *ideal beauty* is subordinate to the *beauty of utility*. So square houses, square doors, square windows, or at least, those constructed on right angles, proving generally the most useful, are therefore regarded as most comely. For the same reason, houses longer than they are wide, or rambling into wings, being found more economically divisible into well-lighted rooms, become the most agreeable to the eye. This diversity gives to a residence an animated and social appearance, and should not be disregarded.

The Roof.—Slate roofs are handsome and durable, and are now much used in the Eastern States; their practicability in different sections of the country will, of course, depend on the cost of the material. As to form, the Mansard French roof is coming rapidly into favor, with such modifications as adapt it to American

houses without sacrificing its unique beauty. Scarcely anything else is now used to cover houses in the vicinity of Boston. The upper roof is almost flat; the lower, nearly perpendicular.

The *Scientific American* says: "All the new houses which have been built in New York recently, have what are termed flat roofs; that is, the roof is nearly level and slants but slightly from one side to the other. The old huge peaked roofs are fast disappearing; we wonder how they ever came into use. The inventor of them must have been a man full of conical ideas. The flat roofs are covered with tin, and well painted. If a fire takes place in a building, it is easy to walk and work on the flat roof, so as to command the fire if it be in the adjacent building; this can not be done on the peaked roofs. Flat roofs are cheaper and more convenient in every respect. We advise all those who intend to build new houses, to have flat roofs to them. It is far better to have a flush story at the top of a building than a peaked, cramped-up garret which is only comfortable for traveling on the hands and knees."

The Color.—A. J. DOWNING protests heartily against the use of white paint on houses, as "entirely unsuitable and in bad taste." He thinks that the glaring nature of this color, when seen in contrast with the soft green of foliage, renders it extremely unpleasant to an eye attuned to harmony of coloring." But he will find many who will protest against his "protest." If "harmony of coloring" in the sense of identity of coloring, be really desirable, why not paint all houses green—especially such as are to be occupied only in the Summer? Nothing could be in worse taste; green blinds are bad enough.

It seems to us that white, as a color for houses, is often well chosen. This very "contrast with the soft green of foliage" produces harmony in many landscapes. It is, perhaps, too generally used; with some surroundings the color will seem more in keeping, if toned down from the glare of white to some pleasant neutral shade. Straw, and the different drabs are agreeable to the eye, and are now much used. Flash is vulgar, and painting wood to imitate stone, is not only vulgar, but a fraud on art. Paint late in Autumn, not during the hot season. It will harden twice as well, and last twice as long.

The Interior.—The sitting, or living room, should be the largest and pleasantest room in the house. It should always be located at the

front, and on the side where the sun will enter the windows. All means should be employed to render it attractive, comfortable, and convenient, for it is generally used for the dining as well as sitting-room, and is occupied for more hours a day than any other apartment. That indispensable nuisance, a parlor, may be a secondary consideration; it has an air of frigid propriety and disuse, and the north side of the house is good enough for it. The kitchen should be spacious, and the pantry and wash-room handy. There can hardly be too many closets. Every house where civilized beings live ought to be from nine to twelve feet between joints.

The Library.—Every house whose occupants pretend to any degree of refinement ought to have a room known as the library or study. Especially should every farm-house be so fitted. This room is quite as important as the parlor. Almost anything else should be sacrificed to it. It need not be large, but it must be comfortable and somewhat secluded, and it should be conveniently furnished. Here there should be maps, shelves for the books, boxes or files for the agricultural papers, and a good desk with apartments for letters, memorandum books wherein to record farm experiments, and a blotter and ledger wherein to keep the farm accounts with animals, fields, and crops. Farmers ought to read more, write more, and think more; they have no business to be clods or bores. With such a room as this made attractive, farmer's boys will be less disposed to stroll about during the long evenings of Winter, or spend their time in idle talk or bar-rooms, stores, and other places where the idle and uncultivated assemble, and where they often acquire the first lessons in smoking, drinking, and gaming. And they will be far more likely to spend their lives on the old homestead, too.

Size of Rooms.—Rooms ought to be of a size to fit carpeting. This point is uniformly overlooked by the hand-books of architecture. Carpeting is, ordinarily, a yard wide, and three-fourths of the patterns are so figured as to require cutting by the yard to make them match. There is not only a sacrificing of harmony but a waste of dollars in carpeting every room whose width is not an exact multiple of a yard—either nine, twelve, fifteen, or eighteen feet. If house-builders and architects would remember this, it would save husbands much expense and housewives much annoyance.

Light.—Do not so arrange your house as to violate God's first command. Give it many

windows, and then, oh housewife, keep your blinds open during the day, and your curtains drawn aside. If you let in the sun freely, it may "fade the carpets;" but if you don't it will be sure to fade the children and their mother. The sun is a good physician; he has never had due credit for his curative qualities—for the bright eyes and rosy cheeks that come from his healing baths. Do you know how puny is the growth of a potato-vine along the darkened cellar wall? Such is the health of human beings living where sunshine is intercepted by the window's drapery. So dark wall-paper is not only gloomy, but it is physically unwholesome. Let in the sun!—for with it come cheerfulness and strength. A dark room is an enemy of good health, good temper, and good morals.

Chimneys.—The household calamity of smoky chimneys can generally be prevented in building new houses, by making a bulge in the flue, so that it will be smallest at top and largest in the middle. Thus, let the throat of the chimney be so constructed that immediately inside of it the space shall be abruptly increased several inches in length and breadth. Let it increase upward for two or three feet, and then be gradually "drawn in" to the dimensions necessary, and let the whole inside of the chimney be plastered with cement, which will harden with time.

There should be a door opposite every fire-place. This diminishes the chances of having a smoky chimney, for in fire-time of year the cold air will be always entering the room at the crevices of the door, and in the direction of the fire-place, and upward through the chimney. The draught of a chimney may be increased by the simple expedient of cutting out a small part of the floor with a saw, so that it may be easily replaced after the fire is kindled. No chimney will "draw" well if there is any wall or other thing near which is higher than the chimney itself. A room that has a fire should always be well ventilated.

An open door, connecting two rooms which have fires, will frequently cause one to smoke, the stronger fire robbing the weaker of its supply of fresh air. So of two stoves on different floors, connecting with the same chimney; if there be a fire in only one, it will be likely to smoke, unless the other be nearly air-tight. The higher a chimney is, and the hotter its air-column can be kept, the better its draught. To prevent the wind from entering chimneys,

cooling the air and driving the smoke down, chimneys are sometimes surmounted with cowl that turn with the wind, and so assist the discharge of smoke.

One of the latest plans is to construct the chimney with an outer shell, so arranged that an air space is provided around the chimney, this space forming a kind of ventilating flue for the building. The shell has its upper end extended above that of the chimney, and provided with openings, through which the wind may pass in horizontal currents. These currents fall against the chimney, and are turned in an upward direction, and thus promote the draught.

In building a chimney put a quantity of salt into the mortar with which the courses of brick are to be laid. The effect will be that there will never be any accumulation of soot in that chimney. The philosophy is thus stated: The salt in the portion of mortar which is exposed absorbs moisture every damp day. The soot thus becoming damp falls down the fire-place, and may be removed with the ashes.

Let every builder watch the carpenters and insist that they put no wood-work about chimneys to expose the house to destruction by fire. Hundreds of thousands of dollars have been lost by such carelessness. Chimneys, moreover, should always stand with a firm base on the ground.

Cellars.—We copy from the *Herald of Health* the following excellent counsel: "Useful as they are, yet cellars are almost universally manufactories of foul air, which, finding its way upward, by means of doors, windows, stairways, and crevices in the floors, diffuses its noxious elements through the rooms above, and so becomes a fruitful source of disease, besides affording a harbor for rats and mice. The surface of the earth is filled with decomposable substances, and whenever air is confined to any spot, it becomes saturated with various exhalations deleterious to health. Means must be provided, therefore, for their thorough ventilation, or cellars must be totally abandoned. A cellar, fully to serve its purposes, should be cool in Summer, impervious to frost in Winter, and at all times free from moisture. The walls should rise one or two feet at least above the surrounding ground, and should be laid in good lime-mortar, or at least pointed with it. The thickness of the wall should not be less than fifteen or eighteen inches; and if the house walls above be built of brick or stone, two feet is preferable.

"The cellar should have a connecting drain at its lowest corner, which should be kept free from obstruction; and each room in it should have at least two sliding windows, to secure a good circulation of air. In very cold climates those portions of the wall above the ground should be double, either by means of a distinct thin wall, on the outside, or by lathing and plastering inside, and be furnished with double windows, as a further security against the frost. An outside door, covering a flight of steps, is desirable in every cellar, and especially in one connected with a farm-house. With proper care, all the walls and their connecting surfaces with the ceilings above, may be made so perfectly tight as to prevent the egress and ingress of vermin; and keeping the cellar clean from rubbish and decaying vegetable matter will insure neatness, sweetness, and health."

Mortar for Cellar Floors.—A correspondent says: "I have seen a great number of plaster or mortar floors, but I never saw one equal to the one in my cellar, not only for hardness and durability but for cost of materials. It is without a single crack and as hard as a stone. It was made in the following manner: When the plastering of my house was finished I found a quantity of refuse lime, which had not slaked soon enough for them, thrown out of the box, and after lying there a few weeks had all become slaked, except a few lumps of unburnt limestone; the largest of these I threw out. I then cast the lime into a large box, or 'mortar bed,' adding a little water, and worked it well with the tools the plasterers had left. The sand I used for plastering was collected from the roads, and consequently contained much small stone. The plasterers, of course, riddled it so that I had several loads of these small stones, etc., lying near the 'mortar bed.' I threw this into the bed and mixed it with the lime; proportion, seven or eight parts to one of lime. I am aware that those who know nothing of the chemical affinity of lime for carbonic acid and silex, would think of improving their floor by adding a larger proportion of lime, especially if they had plenty of it at hand. This would ruin their floor; put it on the land, or let it lie a nuisance sooner than spoil the floor with it.

"Make the mortar stiff enough to bear wheeling in a barrow, lay it about three inches thick, making it the whole thickness as you proceed, beginning at the side opposite the door, and with a corn hoe held with the handle

perpendicular, hit it on the top gently, so as to level the surface, and unite each barrowful with the last laid. My cellar floor has been laid six or eight years, and, when newly washed, the small stones may be seen (worn off level) as close to each other as they would be in a bucket of water, and as firm as shells in a block of marble."

Balloon Frames. — "Ballooning," in architecture, is a term at first applied in derision to a cheap method of framing, believed to result in buildings frail and unsubstantial, and now applied technically to designate the same method, found to result in frames light and substantial. Balloon framing had no inventor; it grew from the sudden necessity of building rapidly and cheaply, in frontier States, where there was plenty of light lumber but few carpenters.

A balloon frame is built wholly of studs, generally two by four inches, two being set side by side for the uprights at the corners, and the whole frame nailed firmly together. It is built without a mortice or tenon, or pin or brace; without an auger or chisel; generally, also, without a joiner, for an intelligent man, who can lay a right-angle with a square, and hang a plumb-line perpendicularly, can serve as his own mechanic.

It is very simple. That which has hitherto called out a whole neighborhood to the "raising," and required a vast expenditure of labor, time, noise, and cider, can, in the adoption of the balloon frame, be done with all the quietness and security of an ordinary day's work. And a man and boy can now attain, with ease, the same results that twenty men could on an old-fashioned frame.

We avail ourselves of quotations from an excellent essay on this subject by GEORGE E. WOODWARD, a New York architect:

"The balloon frame fulfills all the necessary conditions of cheapness, protection, and strength. To these circumstances we must award the early conception of this frame, which, with subsequent additions and improvements, has led to its universal adoption for wooden buildings of every class throughout the States and cities of the West, and on the Pacific coast.

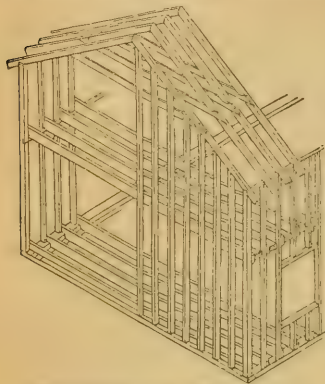
"The balloon frame has for more than twenty years been before the building public. Its success; adaptability, and practicability have been fully demonstrated. Its simple, effective, and economical manner of construction has very

materially aided the rapid settlement of the West, and placed the art of building, to a great extent, within the control of the pioneer. That necessity, which must do without the aid of the mechanic, or the knowledge of his skill, has developed a principle in construction that has sufficient merit to warrant its use by all who wish to erect, in a cheap and substantial manner, any class of wooden buildings.

"Like all successful movements, which thrive on their own merits, the balloon frame has passed through and survived the ridicule and abuse of all who have seen fit to attack it, and may be reckoned among the prominent inventions of the present generation—an invention neither fostered nor developed by any hope of great rewards, but which plainly and boldly acknowledges its origin in necessity.

"The sills are generally three by eight inches, halved at the ends or corners, and nailed together with large nails. Having laid the sills upon the foundation, the next thing in order is to put up the studding. Use four by four studs for corners and door-posts, or spike two by four studs together, stand them up, set them plumb, and with stay laths secure them in position. Set up the intermediate studs, which are two by four inches, and sixteen inches between centers, toe or nail them diagonally to the sill. Then put in the floor joists for first floor, each joist to be placed alongside each stud, and nailed to it and to the sill. Next measure the height to ceiling, and with a chalk line mark it around the entire range of studding; below the ceiling line notch each stud one inch deep and four inches wide, and into this, flush with the inside face of the studding, nail an inch strip four inches wide. This notch may be cut before putting up the studs. If the frame be lined on the inside, it will not be necessary to notch the strip into the studs, but simply to nail it to the studding; the object of notching the studding is to present a flush surface for lathing, as well as to form a shoulder or bearing necessary to sustain the second floor; both of these are accomplished by lining inside the studding. In this rest the joists of the second floor, the ends of which come flush to the outside face of the studding, and both ends of the joist are securely nailed to each stud. The bearing of the joist below is close by the stud, and the inch strip rests on a shoulder or lower side of the notch cut to receive it. This bearing is so strong that the joists will break before it would yield. Having reached the top of the building, each stud is sawed off to an equal height; if any

are too short they are spliced by placing one on top of the other, and nailing a strip of inch board on both sides. The wall plate, two by four inches, is laid flat on top of the studding,

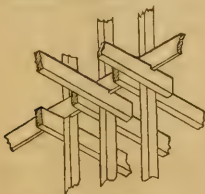


PERSPECTIVE VIEW OF THE BALLOON FRAME.

and nailed to each stud; the rafters are then put on; they are notched, allowing the ends to project outside for cornice, etc. The bearing of each rafter comes directly over the top of each stud, and is nailed to it.

"A balloon frame looks light, and its name was given in contempt by those old foggy mechanics who had been brought up to rob a stick of timber of all its strength and durability by cutting it full of mortices, tenons, and auger holes, and then supposing it to be stronger than a far lighter stick differently applied, and with all its capabilities unimpaired.

"Properly constructed, and with timber adapted to its purposes, it will stand securely against the fury of the elements, and answer every purpose that an old-fashioned timber frame is calculated to fulfil.



MANNER OF FRAMING PARTITIONS THAT RUN TWO OR MORE STORIES.

"In the construction of balloon frame-houses, the studs for those partitions that run through

the building are not cut separately for each floor, as in the old mode of framing, but are preserved entire, or spliced, when required, in the same manner as the outside frame. The studs pass between the joists of each floor, which rest upon a girt one by four inches, let into the studs. The joists are locked over this girt, by cutting an inch notch on the under side, and lap each other from eight inches to one foot, as shown in the preceding figure.

"Houses and barns, and even warehouses, depots, and other buildings of a very large size, can be made stronger by using the balloon frame, instead of the heavy timber frame. Those who prefer to err on the right side, can get unnecessary strength by using deeper studding, placing them closer together, putting in one or more rows of bridging, and as many diagonal ribs as they like. In large buildings there is no saving in timber, only the substitution of small sizes for large—the great saving is in the labor, which is quite important.

"The following are some of the advantages claimed for the balloon frame:

"1. The whole labor of framing is dispensed with.

"2. It is a far cheaper frame to raise.

"3. It is stronger and more durable than any other frame.

"4. Any stick can be removed, and another put in its place, without disturbing the strength of those remaining—in fact, the whole building can be renewed, stick by stick.

"5. It is adapted to every style of building, and better adapted for all irregular forms.

"6. It is forty per cent. cheaper than any other known style of frame.

"7. It embraces strength, security, comfort, and economy, and can be put up without the aid of a mechanic."

A Cheap Brick House.—THOMAS TASKER, of Steuben county, Indiana, writes thus to the American Institute Farmers' Club, telling how he made his own brick for his house: "I dug a circle large enough for a yoke of oxen to work in. I then removed the loam, dug the clay one foot deep—any ordinary clay will answer. I treaded this clay with oxen, and added some straw cut three or four inches long. After the clay was well tempered by working it with cattle, the material was duly prepared for making brick. I then constructed a mold twelve inches long, six inches wide, and four inches thick. Two molds are enough, as one man will mold as fast as another man

will carry away. The bricks are placed upon the level ground, where they are suffered to dry two days, turning them up edgewise the second day; then packed in a pile, protected from the rain, and left to dry ten or twelve days. In all cases, before commencing the walls of the first story, dig down to solid foundation, and fill up with stone to at least one foot above the level of the surface of the ground; and if the stone of the foundation were laid with lime-mortar, so much the better, although mine is not laid with anything. These bricks are not burned in the sun. You can make your molds larger or smaller as you like.

"I have built a house twenty-four feet square, with a wing twelve feet, and I would not trade it for any frame house of the same size that I have seen, and I am satisfied a house built of unburned brick don't cost half as much as a frame, and any laboring man can build his own house. I am satisfied that a house of unburned brick can be built for less than a log cabin of the same size, and it is worth five log cabins."

Artificial Stone.—One of the prospective discoveries of the age seems to be that of artificial stone, by recombining the common elements of decomposed rocks, so as to form durable material for building, and other purposes. Experiments within a few years, encourage the hope that the time will come when we shall have beautiful and durable material from sand and gravel, at cheaper rates than it can now be afforded in common brick. Already one specimen of building block has been made by a hard-pressed compound of sand and lime; another by sand, plaster, and blood; another of sand and the silicate of soda, capable of being moulded, either porous or compact.

The *Chicago Magazine* says: "A chemist—Professor HARDINGE—has discovered a process by which all rock—whether granite or flint—can be turned into *liquid* at the rate of twenty-five tons in twelve hours—then colored and molded into blocks of any shape or size, for building purposes. The material is beautiful beyond description, cheaper than common brick, and after preparation becomes solid as iron." It can not, we trust, be long before some handsome building material can be produced from pulverized or liquefied rock; so cheaply as to be within the reach of all.

Laborers' Cottages.—There is no

more reason why a farmer should expect to board all his hired men than why a manufacturer or merchant should. Why should a farmer's wife alone be made a drudge of, when plain cottages can be so cheaply erected for the occupancy of the laborers who do the work of the farm? It is widely felt that the want of domestic seclusion and comfort occasioned by the apparent necessity of "feeding the hired men," renders the farmer's home unnecessarily repulsive to young people.

Girls, especially, must regard with no little dread, a prospective life of drudgery in providing three meals a day for five to twenty hungry, sweaty, and uncleanly men; in being compelled to incorporate them into the family, to give them a place at the evening fire-side, to do their washing and to furnish them with room night and day. They know very well from observation, that the wives of mechanics and shop-keepers often preserve the bloom and elasticity of youth, long after farmers' wives of the same age have become pale, wrinkled and bent, under the accumulated labors of kitchen life.

Rural Affairs says: "Having actually tried the experiment of separate cottages for twenty years, we earnestly commend it to others; and we are sure that if farmers' daughters, before they give an affirmative answer to the young men who apply for their heart and hand, would require the erection of such cottages as a condition of matrimonial engagement, a reformation would rapidly take place. There are many advantages in hiring men with families. They are generally more steady, reliable and uniform. They will usually take a portion of their wages in provisions for their family supplies. Their wives, having comparatively little to do, can provide their meals at less cost than the same can be done by the hired 'help' of the farmer, and consequently such laborers generally charge but little more for their own board than the actual cost of the provisions."

No farmer with proper consideration for his wife, will, if it can be avoided, introduce his hired men as permanent members of the household, for it totally breaks up and destroys the family relation. The farm-house that should be and might be a happy home, becomes a mere boarding-house in which the natural relations are reversed, for the husband is steward, the wife cook, and the hired men and children the independent boarders. The employed become the served, and the employers the servants. Such a condition of things is intolerable to a

well-bred woman, and quite incompatible with the existence of genuine home comfort.

For the highest personal comfort, the farm ought to be just large enough for the labor of the owner and his boys, and the farm-house just large enough for the occupation of a growing family, with a generous margin for hospitality.

If the farm needs to be larger than this, let not the homestead be invaded by "the hired men," but let them be housed and fed in cottages built for them. This arrangement will prove infinitely more agreeable to all; and more economical, too, for a married workman can board himself, in his own way, much cheaper than his employer can board him, while he can also keep the unmarried hired men on terms equally advantageous to all.

While the practice we have deprecated exists, we shall not be surprised to see farmers' sons rebelling against their lot and flying to cities, or the daughters of farmers setting their caps for merchants, ministers, doctors, lawyers, carpenters, teachers, tailors, tinkers—anybody but their agricultural neighbors. They see that, while their fathers have made money, their mothers are furrowed with premature age, because they have been drudges all their lives, bent to a furious rotation of scrubbing, ironing, baking, stewing, sewing—two-thirds of it for "the hired men." Mr. THOMAS says he heard a most worthy and intelligent woman, who at fifty looked old enough for seventy, remark, that at a fair estimate she had cooked at least fifty tons of food for laboring men. What wonder that so many women think with a shudder of spending a life-time in the role of farmers' wives? Is it not high time that agriculture was made pleasant and attractive to young people, as it is in its nature, honorable and profitable?

The wretched community system has prevailed long enough in America, to the amazement of foreigners and the disgust of our own people; it is high time that every farmer with a particle of personal sensibility or independence, or with any respect for the rights of his companion, should adopt a better way. Whenever this system of separation has been tried, it has resulted in the increased thrift of the farmer, the emancipation of his wife, and an accession of comfort and self-respect to the laborer.

A Few Brief Rules.—The following rules to be observed in building houses, may afford some useful suggestions to those about to engage in such an undertaking:

1. Keep the cost within the means. It is better to have a small, plain house paid for, than a large, fine house, with a cupola and mortgage on it. Discriminate between *real* needs and imaginary ones.

2. Select a convenient location rather than a showy one, if you can not combine the two.

3. Build of such good materials as are near at hand. An index is thus afforded to the resources of the region, with the addition of economy over the use of such as are "far brought and dear bought."

4. Prefer lasting to perishable materials, even if more costly. A small well-built erection is better than a large decaying shell.

5. Discard all gingerbread-work, and adopt a plain, neat, and tasteful appearance in every part. Far more true taste is evinced by proper forms and just proportions than by any amount of tinsel and peacock decorations.

6. Where convenient or practicable, let the plan be so devised that additions may be subsequently made, without distorting the whole.

7. In all *country* houses, from the cottage to the palace, let the kitchen (a most important apartment) always be on a level with the main floor. It requires more force to raise a hundred pounds ten feet upward, whether it be the human frame or an assortment of eatables, than to carry the same weight one hundred feet on a level. To do it fifty times a day is a serious task. Where the mistress superintends her own kitchen, it should be of easy access.

8. Every entrance from without should open into some entry, lobby, or hall, to prevent the direct ingress of cold air into rooms, and to secure sufficient privacy.

9. Flat roofs should be adopted only with *metallic* covering. Shingles need a steeper inclination to prevent the accumulation of snow, leakage, and decay—more so than is frequently adopted.

10. Always reserve ten per cent. of cost for ornamenting the lawn. A hundred dollars in evergreens, grading, turfing, and rustic seats will add more to the market value of a place than thrice that sum expended on the house itself.

Designs.—We present herewith a few designs for neat dwellings, aiming to select such as will be useful to those about to build. Different styles and sizes will be found represented, and also different prices, from the plain and cheap to the moderately expensive, omitting, however, the very elaborate and ornate. For

these our readers are indebted (with the exceptions mentioned) to *TUCKER'S Rural Affairs*, Albany, an annual publication of the highest value to the farmer.

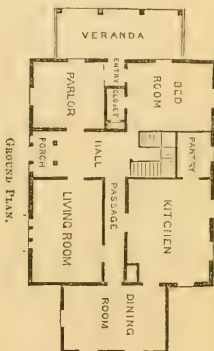


ITALIAN FARM-HOUSE.

This design exhibits a dwelling expressive of an air of modest and refined neatness, free from any bold or prominent peculiarity of architecture. Its general air is that of the Italian style, presenting the varied outline and freedom from stiffness for which this mode of building is distinguished, but without a rigid adherence to architectural rules. It is intended for a refined family in moderate circumstances, either as a farm or suburban residence. Without any attempt at costly ornament, it aims to give a tasteful exterior. A profusion of decora-

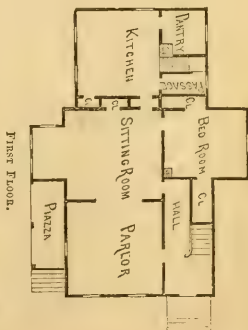
tion, or, as commonly termed, "gingerbread work," is one of the most common faults in our newer country dwellings, generally showing a want of architectural taste.

If the family dine in the sitting or living-room, the dining-room given in the plan below may be omitted, or it may be pushed back twenty feet and divided into a dairy and wash-room—the living-room opening upon a small veranda. The second floor can be arranged to suit the judgment of the builder.



HOUSE WITH CURB ROOF.

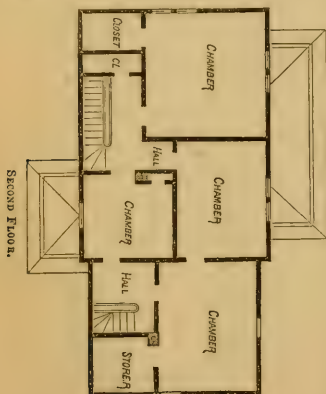
This cut is given by E. C. GARDNER, in *Hearth and Home*, as "a cheap dwelling-house." The designer estimates that if the main building were 22 by 30 feet, wing 16 by 20 feet, first story 10 feet high, and second story 9, it would cost, in these high times, \$2,500.



If the upper roof had a flatter pitch, it would represent, pretty accurately, the French-roof houses now (1869) so popular in the New England States. The annexed cut shows a very convenient arrangement of rooms.

The author says: "Two people dwelling together in harmony do not more surely grow to

look alike than two apartments placed in close communication. This is one of the very few merits of folding or sliding doors. By extending the hospitable table into the large bay-window, the sitting-room becomes a capacious dining-hall. Pantry, cellar-stairs, and back stairway are all handy, and, if desired, a north-west passage may be made from the kitchen to the bed-room through the closet. Upon the second floor, which is of the same size as the first, there are four good chambers. Of closets there are four up stairs, the family bed-room rejoices in two—a luxury which one side of the house will surely appreciate; a china closet from sitting-room and cupboard from kitchen. Piazza and porches as may be needed."



The FRONTISPIECE and accompanying plans of an IRREGULAR COUNTRY HOUSE are adapted from CALVERT VAUX's work on "Villas and Cottages," a very complete and perfect treatise on the better class of country houses, and possessing the rare merit of combining compact and convenient plans with neat and picturesque exteriors. In the plan of the first floor, the library may be turned into a family bed-room and nursery in those country houses where the latter seems to be more needed.

In the chamber plan will be found five bed-rooms, and the indispensable bath-room and water-closet; and in the wing two bed-rooms, a linen-press, and a housemaid's sink. All these rooms are supplied with registers for the egress of foul air. In the garret over the bath-room is a large well-lighted linen-room, and as this

is planned on the half-landing, it is very easy of access from the chamber floor. This house can be built in these times for \$3000 to \$4000, according to finish.



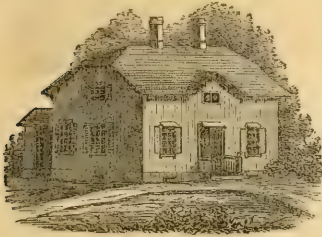
In this design, GEORGE D. RAND, of Hartford, furnishes the plan of a pleasant country-house, neither pretentious nor very expensive, but with large, airy rooms, and first-class accommodations.



In its exterior this house is somewhat irregular, yet so arranged that the parts harmonize



with each other, and join together without those expensive and troublesome gutters which are often the accompaniment of many stylish houses. The main hall and a portion of the kitchen are in a lean-to, which is carried forward far enough to form the wide veranda. A corner of the dining-room and the adjacent alcove, are formed in the same way on the opposite side. The remaining peculiarities of the design are readily seen from the accompanying plans. The author says: "This house can be built for \$2500"—but that was in 1859.

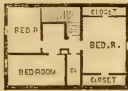


PLEASANT COTTAGE.

We give one more design of a house costing some \$1200 or \$1500, but which possesses several important conveniences. It meets some of the wants of refined domestic life, although in a small and humble way.



PRINCIPAL FLOOR.



CHAMBER PLAN.

Ventilation.—If, as OLIVER WENDELL HOLMES tells us, we inspire and expire forty hogsheads of air a day, rob it of some pounds of oxygen, and load it with other pounds of carbonic acid gas, we must need a very large supply for our daily use. The ventilation of our houses, so as not to invite the opposite peril, draughts of cold air, is easily and cheaply accomplished; yet the lack of it is still the greatest fault of American country homes.

It is a notorious and undeniable fact, that the old-time hardy race of New England farmers, who used to drink cider and crack nuts and

jokes around the old-fashioned mammoth fire-places, so vividly engraven upon our mind, have passed away and left a puny, pale-faced race sitting around the stoves of modern-built country houses, close-fitting windows, and listed doors, shutting out the pure air of heaven, while man within, after breathing carbonic acid gas for a whole evening, wonders what makes him feel so languid and unfitted for the enjoyment of social intercourse with his family; but, as he is unable to arouse his spirits, he retires to rest in a room heated to the same degree, and just big enough to contain himself and wife, and children, which he closes almost as tight as though it were hermetically sealed; then buries himself in the soft embrace of a feather bed and pillows, and after ten hours of thus tempting death rather than rest, he wonders what on earth makes him "feel so poorly of a morning."

There has been immense improvement in this matter within ten years, especially in the cities, but much remains to be done. No room should ever be constructed without permanent provision for ventilation. Open windows are not sufficient, even when hung, as they should be, with cords and weights. It is to be remembered that *one* opening will not properly ventilate. You can not take air out at one place without admitting air at some other place. It is known to be impossible to draw water freely from a barrel by merely making one opening, and it is equally impossible to draw air from a room which has but one opening. Therefore to ventilate a room, there must be an opening to admit air to supply the place of that which you wish to remove; if these two openings are not provided, the regurgitation through one will be an operation miserably inefficient, utterly unworthy of being called ventilation.

Moreover, the impure air does not always rise; the heavier impure gases settle to the floor. Sometimes it is found difficult to warm a room, because the heat can not penetrate the dense strata of impure air stagnating below. Every room, therefore, should be ventilated by an aperture near the ceiling, and another through the wash-board, both supplied with valves and communicating with the external air.

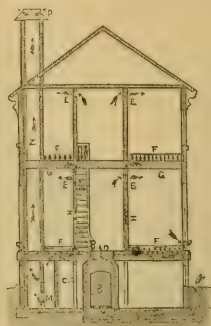
It should not be necessary here to dwell upon the fact that by the repeated passage of the same air through the lungs, it may, though originally pure and wholesome, be so strongly impregnated with carbonic acid, and lose so much of its oxygen as to be rendered utterly

unfit for the continued maintenance of the aerating process; so that the individual who continues to respire it, shortly becomes asphyxiated. There are several well known cases in which the speedy, death of a number of persons confined together has resulted from the neglect of the most ordinary precautions for supplying them with air. That of the "Black Hole of Calcutta," which occurred in 1756, has acquired an unenviable pre-eminence, owing to the very large proportion of the prisoners—one hundred and twenty-three out of one hundred and forty-six—who died during *one night's* confinement in a room eighteen feet square, only provided with two small windows. On the night of the first of December, 1848, the deck passengers on board the Irish steamer London-derry were ordered below by the captain, on account of the stormy character of the weather, and although they were crowded into a cabin far too small for their accommodation, the hatches were closed down upon them. The consequence of this was, that out of one hundred and fifty individuals no fewer than seventy were suffocated before the morning, simply by being compelled to breathe the same air over and over.

Ruttan's System of Ventilation.—The principle that pure air can not enter a room until the impure air is expelled to make room for it, is that on which H. RUTTAN's system of warming and ventilation is based. Cold air is admitted in abundance to the "air warmer," where it is *warmed* (not heated *red hot* and its life-sustaining qualities vitiated) then rises and is diffused through the room or rooms, by means of transoms near the ceiling; while the cold air being heavier, falls to the floor and escapes at or near the bottom of the room, passes beneath the floor, and is collected into the foul air shaft and escapes into the outer air. The accompanying cut will show the arrangement of a house built on this plan.

It represents a transverse section of a building through the cellar and two stories, showing the mechanical arrangement of the openings for the in-coming and out-going air, as arranged on RUTTAN's system. At a glance it will be seen that the cold air is received through the shaft A, which passes from thence through the Air Warmer B and Floor Register D into the hall above, and into the rooms through the Transoms E, thence down under the floor through the Open Base F, and in the second story, between the floor and ceiling (space G), to the Hollow Partition H, down

under the first floor (space K), thence into the Gathering Duct or Foul Air Receptacle M, thence into the Chimney or Exhaust Shaft N, and out through the Ventilating Cap P, into the open air.



SECTION OF VENTILATED BUILDING.

Explanation.—A—Cold Air Duct. B—Air Warmer. C—Smoke Pipe leading into Chimney. D—Floor Register. E—Transoms through which Hot Air passes into Rooms. F—Open Base. G—Space between Floor and Ceiling. H—Hollow Partition through which Foul Air passes downward to space under first floor. K—Space between lower floor and cellar ceiling, showing furings on joists. M—Gathering Duct, or Foul Air Receptacle, opening into Exhaust Shaft or Smoke Flue. N—Chimney, or Exhaust. P—Emerson's Ventilating Cap, through which Smoke and Foul Air passes.

Professor J. A. SEWELL, of Normal University, Illinois, presents this method in the Illinois State Agricultural Report for 1866, and commends it strongly. "In a room thus ventilated," he says, "the air *can not* become impure, because, as we have before stated, the carbonic acid exhaled from the lungs, being heavier, falls to the lower part of the room and escapes, while pure air from without takes its place. Here, then, we have a perfect system of ventilation. We secure a complete supply of pure warmed air, but without strong currents being established, while the impure air flows out continually. Another great advantage gained by this plan is the *equality of the temperature of the air*. Actual experiment shows that there is not more than five degrees Fahrenheit difference between the temperature at the ceiling and that near the floor; while, in a room warmed by a stove, the difference is from twenty to forty-five degrees Fahrenheit.

"This plan of passing the foul air out at or near the floor is emphatically new. The purest and warmest air is always at the top of the room; while the coldest and most impure is always at the bottom. If we make an opening at the top of a room, the purest and warmest

air will escape; if at the bottom, the coldest and most impure will escape. It would seem that it is not difficult to determine which of these two plans is the sensible and true one. It scarcely seems necessary to claim more for this system. If pure air is so absolutely essential to physical well being, and if we can adopt any means, however expensive, to secure it, we might rest satisfied.

"But it is far from being expensive; while, on the contrary, a building, whether large or small, can be constructed as cheaply with such provision for ventilation as without it, and can be warmed at much less expense than by any other plan. *The cost, as compared with that of heating by steam, is less than one-third, as I have clearly demonstrated by a series of careful experiments and observations. As compared with the ordinary hot-air furnaces, it is not more than one-half. As compared with ordinary stoves, it is decidedly less.* In short, this system seems to possess every possible advantage. It is simpler, cheaper; and, best of all, it gives what is so much needed—a full, complete, and constant supply of pure air; and I honestly believe that, when this system is generally adopted in our country, the rates of mortality will indicate a marked decrease."

It is proper to add that some careful observers, who have examined RUTTAN'S method of ventilation, express to us doubts of its uniform practicability. It should be adopted with caution until its merits are more definitely settled.

BARNs AND OUT-BUILDINGS.

Barns.—We build larger and better houses than our grandfathers did; but the improvement in barns is even more striking. Perhaps Pennsylvania exhibits a better average of barns than any other State; but in New York, Ohio, and some adjacent sections, it is getting to be fashionable to have a first-rate barn, and the best farmers cherish a growing pride in their accommodations for stock. Throughout the Eastern and Central States, large and excellent barns have greatly multiplied within fifteen years, and many of them are planned and built upon principles of sound science and the most rigid business economy.

In the West and South.—Nothing so shocks a thrifty Eastern farmer, traveling in the West, as the general lack of barns and out-houses upon otherwise well-improved farms. "And these men without stables," he exclaims in

astonishment, "are the nation's beef producers! These prairies without barns are the nation's granary!" It certainly is a slovenly state of things, to be corrected as soon as possible. Barns, in the oak openings of the West, were at first dispensed with from apparent necessity, existing partly in the scarcity of lumber, partly in lack of funds, and partly in the facility of starting a large farm all at once. And thus, stacking out, threshing, and storing out the grain in rude shelters, and leaving the neat cattle to stand in the lee of a rail fence, or to fight for the sunny side of a straw pile, assumed the form, and, in many cases, the inveteracy of a habit.

It is true that some Western farmers have made commendable progress, and shown much enterprise, in the building of barns, sheds, and stables for the proper housing of crops and cattle; but it is equally true that the many are still lamentably deficient in these conveniences, and are so accustomed to doing without them that they do not know how much they would add to their comfort and thrift—answering at once the demands of humanity and economy.

In Wisconsin, Minnesota, Iowa, Kansas, and Nebraska, a majority of the barns are simple poles or boards, forming a skeleton frame, covered with heavy masses of straw from the stacks, excluding nearly all light and air from the interior; and in these horses, cattle, and sheep lie upon their filth, until the whole structure is a mass of rotten straw, mold, and reeking dampness. In some cases these rude hovels are arranged with some regard to cleanliness and healthfulness of stock, but most of them are damp, noisome, and repulsive in the extreme. The business of stock-raising in the West can never be sufficiently extended or properly remunerative, until more attention is bestowed upon barns and cattle-sheds.

In the South it is a little worse, and only a little, with no barns or shelter whatever. In a good Winter, in the lee of fodder-stacks, the protection of a forest, or the driest hummocks of a canebrake, the animal may seek the range in a medium condition.

Says the United States Commissioner of Agriculture: "The attention of Southern farmers is called to the urgent necessity for a better provision of forage for horses and cattle. The most disheartening reports of weakness and death from lack of nutrition have been received—in some instances of horses and mules dropping down exhausted in the furrows. The millions lost by such indifference and inefficiency,

in the sacrifice of flesh, health, and ability to fatten, are scarcely less than the heavy losses now incurred by actual disease."

The Utility of a Barn.—It seems not to be conceded by all that a barn is an essential, or even a useful appendage to farming operations—else why the extensive districts of country, even above 40°, where it is almost entirely dispensed with? The amount of waste and loss resulting from exposure, is overlooked by careless managers. Cattle have been found, by numerous experiments in different latitudes, to remain in better order and spirits when stabled than when exposed, *on two-thirds the food*—one-third being consumed in sustaining the animal warmth in open air. Milch cows, well protected, give about one-third more milk on the same feed. For a herd of twenty cows, therefore, about ten tons of hay would be saved every Winter, and at least twenty-five dollars worth of milk—total, one hundred and fifty dollars. That part of the barn occupied by their stables would not cost more than twice this sum. In other words, the stables would pay for themselves biennially. They would, in short, pay \$1,500 in ten years, besides interest; or with interest, about \$2,750—double the entire cost of a fine barn.

Northern sheep-raisers find that the saving of life and the increase in the amount of mutton and wool, afforded by good shelter, will pay for the erection of buildings every two years.

By continuing these estimates, it will be discovered that, taking everything into account, the farmer who neglects to provide good farm-buildings, sinks a handsome fortune every twenty years, greater or less, according to the extent of his operations.

Hon. FREDERIC WATTS, of Carlisle, Pennsylvania, writes:* "There is, perhaps, no section of country in the United States where agriculture is pursued with such profitable results as in the southeastern counties of Pennsylvania, including Cumberland, York, Dauphin, Lebanon, Lancaster, Chester, Delaware, Montgomery, Bucks, and Berks, where farms rarely exceed one hundred and fifty acres, and upon each of which the bank [or basement] barn is deemed as absolute a necessity as the plow itself." Corroborative testimony, showing that *it pays to have a good barn*, is furnished by the best farmers of every State, and the claim must soon be admitted and acted on by all.

Comfort is the first thing to be considered by

the farmer, and elegance the second—unless his means are adequate to both; in which case we propose not to excuse the plain log cabin, for the family, or the meaner log barn for the dependent brutes, while thousands are expended for the acquisition of new and unneeded lands.

No man has a right to keep more stock than he can comfortably provide for; such extravagance is both cruel and unprofitable; and this rule has only temporary exceptions—even among the frontiersmen who, for a few years, may be compelled to "rough it." Every farmer ought to have a warm roof where all his stock may find shelter, instead of leaving the poor brutes unhoused, suggesting the forlorn picture of THOMSON:

"In awful gaze
The cattle stand, and on the scowling heavens
Cast a deploring eye—by man forsaken,
Who to the crowded cottage hies him fast."

Location.—A barn should always be located lower than the house to which it is an appendage, and when practicable, on a southern-sloping hill-side, at a distance of ten or twelve rods—growth of choice fruit or shade trees between. It ought to have a basement, windowed upon the north, and opening wide to the south upon the barn-yard; and the site ought to be such that whatever drainage there is shall be upon the owner's land. It is desirable that every yard should have a firm clay bottom, and there should be an excavated basin just below it, to catch the drippings and accommodate the indispensable compost-heap. This basin should always be covered. The bleakest yards can be made permanently comfortable in a few years by planting a tree-belt around them. If they were so surrounded, the cattle would keep cheaper and be less liable to disease.

Size.—Farmers should remember that *barns are seldom found too large*, and that one spacious barn is generally thought to be more economical than a small barn, with half a dozen rambling sheds and cow-houses adjacent. Mr. WATTS, describing the Pennsylvania barns says: "There is a principle which should enter into the construction of every barn, that its size should be in its height, while its height should not necessarily increase the amount of labor requisite for its use; for it will be readily perceived how much the weight of the grain itself must contribute to the capacity of the mow which holds it. A few feet of additional frame in height adds but little to the original cost; while to extend the frame horizontally costs the same, and requires additional roofing,

* Essay on "The Pennsylvania Barn," U. S. Agricultural Report, 1844.

and the advantage of weight is comparatively lost. This height of barn, and economy of labor in using it, is attained by constructing the inner frame with two sets of floors, one above the other, using the upper one to drive into, thus reaching with the loaded wagon the height of the middle of the mow, instead of the bottom of it, and thus, too, superseding the necessity of pitching grain to any great height."

Cleanliness about Barns.—There is no reason why the barn and its accessories should not be cleanly. The yard ought to be a slightly concave basin, from which the liquid manure should be drawn off into a vat for its retention, already described; and the solid excrement of the stock should be gathered, as often as once a day into the compost heap.

Moreover, barns ought to be so constructed that all the hay-mows, granaries, stacks, and stables shall be easily accessible without passing through the yard at all. In this matter, the course which is furthest from neatness is also the most unprofitable.

There are men who always travel with the odor of the stable clinging to their boots, whose approach is announced by a prophetic odor, but whose departure does not remove the evidence of their late presence. Their houses, from garret to cellar, are redolent of their occupation. A cleanly woman, in such a house, is an object of pity. Many such women have patiently borne what was to them a serious and real hardship, rather than, by complaining, incur the charge of discontent with their proper sphere of life, as though industry and filth were inseparable.

This is entirely unnecessary. The stables may be so ventilated and contrived, and the cattle-yards so drained, that this nuisance may be avoided, with profit at the barn, as well as comfort at the house. To disregard this incessant disgust of a sensitive woman, because the olfactory of her more stolid husband are not so acute, is scarcely less than brutal.

We copy the following essay from TUCKER'S *Rural Affairs*, as being a compact and comprehensive treatise on Barn Building:

Estimating the Capacity of Barns.—Very few farmers are aware of the precise amount of shelter needed for their crops, but lay their plans of out-buildings from vague conjecture or guessing. As a consequence, much of their products have to be stacked outside, after their buildings have been completed; and if additions are made, they must of necessity be put up at the expense of convenient arrangement. A brief

example will show how the capacity of the barn may be accurately adapted to the size of the farm.

"Suppose, for example, that the farm contains one hundred acres, of which ninety are good arable land; and that one-third each are devoted to meadow, pasture, and grain. Ten acres of the latter may be corn, stored in a separate building. The meadow should afford two tons per acre, and yield sixty tons; the sown grain, twenty acres, may yield a corresponding bulk of straw, or forty tons. The barn should, therefore, beside other matters, have a capacity for one hundred tons, or over one ton per acre as an average. Allowing five hundred cubic feet for each ton (perhaps six hundred would be nearer) it would require a bay or mow forty feet long and nineteen feet wide for a ton and a half to each foot of depth. If twenty feet high, it would hold about thirty tons. If the barn were forty feet wide, with eighteen feet posts, and eight feet of basement, about forty-five tons could be stowed away in a bay reaching from basement to peak. Two such bays, or equivalent space, would be required for the products of ninety well cultivated acres. Such a building is much larger than is usually allowed; and yet without it there must be a large waste, as every farmer is aware who stacks his hay out; or a large expenditure of labor in pitching and repitching sheaves of grain in threshing.

"In addition to this, as we have already seen, there should be ample room for the sheltering of domestic animals. In estimating the space required, including feeding alleys, etc., a horse should have seventy-five square feet; a cow forty-five feet; and sheep about ten square feet each. The basement of a barn, therefore, forty by seventy-five feet in the clear, will stable thirty cattle and one hundred and fifty sheep, and a row of stalls across one end will afford room for eight horses. The thirty acres each of pasture and meadow, and the ten acres of corn-fodder, already spoken of, with a portion of grain and roots, would probably keep about this number of animals, and consequently a barn with a basement of less size than forty by seventy-five would be insufficient for the complete accommodation of such a farm in the highest state of cultivation.

Form of Barn Buildings.—It has formerly been a practice, highly commended by writers, and adopted by farmers, to erect a series of small buildings in the form of a hollow square, affording an open space within this range, sheltered from severe winds. But later experience,

corroborated by reason, indicates the superiority of a single large building. There is more economy in the material for walls; more in the construction of roofs—a most expensive portion of farm structures—and a saving in the amount of labor, in feeding, threshing, and transferring straw and grain, when all are placed more compactly together. The best barns are those with three stories; and nearly three times as much accommodation is obtained thus under a single roof, as with the old mode of erecting only low and small buildings.

An important object is to avoid needless labor in the transfer of the many tons of farm products which occupy a barn. This object is better secured by a three-story barn than by any other, where a side-hill will admit of its erection. The hay and grain are drawn directly to the upper floor, and nearly all is pitched downward. If properly arranged, the grain is all threshed on this floor, and both grain and straw go downward—the straw to a stack or bay, and the grain through an opening into the granary below. Hay is thrown down through shoots made for this purpose to the animals below, and oats are drawn off through a tube to the horses' manger. The cleanings of the horse stables are cast through a trap door into the manure heap in the basement. These are the principal objects gained by such an arrangement; and as the labor of attendance must be repeated perpetually, it is very plain how great the saving must be over barns with only one floor, where hay, grain, manure, etc., have to be carried many feet horizontally, or thrown upward.

How to Plan a Barn.—The first thing the farmer should do, who is about to erect a barn, is to ascertain what accommodation he wants. To determine the amount of space, has already been pointed out. He should next make a list of the different apartments required, which he may select from the following, comprising most of the objects usually sought:

1. Bay or mow for hay. 2. Bay or mow for unthreshed grain. 3. Bay or mow for straw. 4. Threshing floor. 5. Stables for horses. 6. Stables for cattle, and calf pens. 7. Shelter for sheep. 8. Root cellar. 9. Room for heavy tools and wagons. 10. Manure sheds. 11. Granary. 12. Harness room. 13. Cisterns for rain-water. 14. Space for horse power.

"If these are placed all on one level, care should be taken that those parts oftenest used should be nearest of access to each other; and that arrangements be made for drawing with a

cart or wagon in removing or depositing all heavy substances, as hay, grain, and manure. In filling the barn, for example, the wagon should go to the very spot where it is unloaded; the cart should pass in the rear of all stalls to carry off manure; and if many animals are fed in stables, the hay should be carted to the mangers, instead of doing all of these labors by hand.

"If there are two stories in the barn, the basement should contain [this plan to be adapted, however, to the predominant work of the farm]: 1, Stable for cattle; 2, shelter for sheep; 3, root cellar; 4, coarse tool room; 5, manure shed; 6, cistern; 7, horse power. The principal floor should contain: 1, Bays for hay and grain; 2, threshing floor; 3, stables for horses; 4, granary; 5, harness room.

"For three stories, these should be so arranged that the basement may be similar to the two-story plan, and the second story should contain: 1, Bay for hay; 2, stables for horses; 3, granary; 4, harness room. The third, or upper story, 1, threshing floor, 2, continuation of hay bay; 3, bays for grain; 4, openings to granary below.

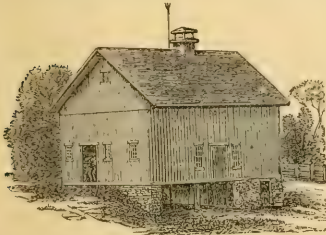
"In all cases there should be ventilators, shoots for hay, ladders to ascend bays, and stairs to quickly reach every part. Every bin in the granary should be graduated like the chemist's assay-glass, so that the owner may, by a glance at the figures marked inside, see precisely how many bushels there are. A black-board should be in every granary, for marking or calculating; one in the stable, and a third to face the threshing floor.

Basements.—It may be laid down as a general rule, that every barn should have a basement. Its only cost is excavation and walls. The building need not necessarily be on a hill-side, as a moderate artificial mound and a short bridge will afford ready access by teams to the floor above. If the basement walls be of stone, the security they afford the sills against moisture and decay will save enough to pay for excavation and constructing wagon way."

Cost of Barns.—The *Annual Register*, for 1865, gave the following as a general rule, to be modified in different localities, according to the price of lumber, labor and economical management on the part of the builder: "A common, well-built farm barn, not planed or painted, with stone basement, will cost \$1, for each two and a half to three square feet. For example, a barn measuring thirty-five by fifty feet, and thus containing 1750 square feet, will cost from

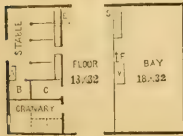
\$585 to \$700. If planed and painted, and correspondingly finished, \$1 will pay for about two square feet; and it would consequently cost about \$875. Farmers who are about to plan and erect barns, will find this approximate rule, derived from a number of actual bills of cost, of considerable convenience."

"*A Barn for Fifty Acres or Less.*—The plan here given is sufficient for a farm containing fifty acres under cultivation, and yielding good crops, with general or mixed husbandry. For special departments of farming it must be modified to apply to circumstances. The plan of the principal floor is given below. Being built on a moderately descending side hill, the threshing floor is easily accessible through the wide doors



—PERSPECTIVE VIEW.

on the further side, and the wagon, when unloaded, is backed out. These doors should be each at least five feet wide, so as to give an opening of ten feet; and about twelve feet high, to allow ample space to drive in a load



PRINCIPAL FLOOR.

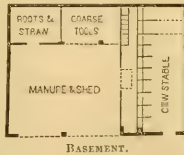
- A. A trap door, for throwing down manure.
- B. Closet, for harness, saddle, buffalo skins, etc.
- C. Tool room.
- E. Trap door for straw and roots.
- F. Ladder to bay.
- V. Ventilator and hay shoot.
- S. Stairs to basement.

of hay. The door at the other end of the floor is about five feet wide, and is used for throwing out straw. A narrow window on each side of this door, and one with a row of single horizontal lights over the large doors, keep the floor well lighted, when stormy weather requires the doors to be shut. The bay,

on the right, will hold at least one ton of hay for every foot of height, or some twenty or twenty-five in all. By marking the feet on one of the front posts, the owner may know, at any time, with some degree of accuracy, how many tons of hay he has in this bay, after it has be-

come well settled. The upright shaft, V, serves at the same time to ventilate the stables below, and for throwing down hay directly in front of the cow stables. It should be made of planed boards inside, that the hay may fall freely, and for the same reason it should be slightly larger downwards. It should have a succession of board doors two feet or more square, hung on hinges so as to open downward, through the openings of which the hay is thrown down for the animals. When not in use, these doors should be shut by turning upward and buttoning fast. A register should be placed in this shaft, to regulate the amount of air in severe weather. This may be a horizontal door at the bottom, dropping open on hinges, and shut by hooking up closely or partially, on different pins.

"*The Granary* eight by thirteen feet, contains three bins, which have a part of the front boards moveable or sliding, so that when all are in their place they may be filled six feet high. They will hold, in all, about three hundred and fifty bushels. The contents of each bin may be readily determined by measuring and multiplying the length, breadth, and depth, and dividing the number of cubic feet thus obtained by fifty-six, and multiplying by forty-five. The result will be bushels. It will, therefore, be most convenient to make each bin even feet.



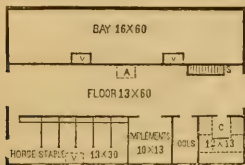
"*The Basement.*

This needs but little explanation. The cows are fed from the passage in front of them, into which the hay-shoot dis-

charges, in front of which a door opens to the shed, for the ready feeding of animals outside. The two inner stalls, shut with gates, serve for calf pens when needed. Coarse implements, as sleds in Summer, and wagons and carts in Winter, may occupy the inclosed space adjoining, entered by a common gate. If a lever horse-power for threshing is used, it may be placed in the 'shed' in the basement; but it would be better to use a two-horse endless chain power, which may be placed on the floor above, and used for threshing, cutting stalks, and other purposes. The farmer may thus do his own threshing in Winter, and on stormy days, with the assistance of a hired man, not only thus saving much expense, but turning out a fresh supply of straw whenever needed. The

cost of this barn, if built rough, would be about \$500; planed and painted, \$600 or \$700.

"Barn for Seventy-Five to a Hundred Acres. This barn stands on a slight declivity, and is so constructed that a wagon may be driven through it, obviating the necessity of backing out. Its size is forty-two by sixty feet. (Its capacity may be increased to any extent by greater length.) The main floor is lighted by



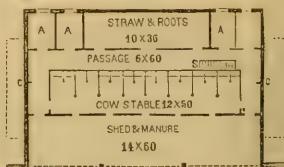
PRINCIPAL FLOOR.

- A. Trap door and shoot for straw and chaff.
G. Granary.
V.V. Ventilators and hay shoots.
S. Stairs to basement.

a long horizontal window over each double door; the trap door for straw turns down and buttons up under the girth; if desired, two more may be placed outside the ventilators. A smooth planed shoot below allows the straw to slide freely in the root and straw cellar below, and a cart of roots is dumped down this shoot. Roots will keep finely if a foot of straw is first thrown down, then several feet of roots, then a few additional feet of straw or chaff to protect them from freezing.

"The plan of the basement nearly explains itself. There are a number of sliding board windows in the rear of the cow stalls, for throwing out manure, and over a part of them glass windows for admitting light. It will be observed how accessible the roots, straw, and hay are in front; and that the manure in the rear is easily drawn off by a cart, without the necessity of resorting to the wheelbarrow, except it be in cleaning the cow and calf pens.

"There are over three thousand square feet of surface on the roof, and about two thousand barrels of water fall annually upon it, in the form of rain, affording five or six barrels daily for watering cattle, if watered by it, all the year round. The cisterns should, therefore, hold not less than five hundred barrels. (This size will not be needed if there are other supplies of water—or if the herd is not large enough to consume so much.) If these are each twenty-five feet long and six feet wide, they will hold this amount. They should be well built, of masonry and water-lime, and arched over the top like a stone culvert, so that there will never be danger of the embankment falling in. A good well in the middle of the passage, with a pump, would obviate the necessity of these cisterns.



BASEMENT.

- A. A. A. Boxes or pens for calves and cows with calf, 6 by 10 feet each.
C. C. Cisterns under the wagon-way or abutments, from which water for cattle may be drawn through a cock.

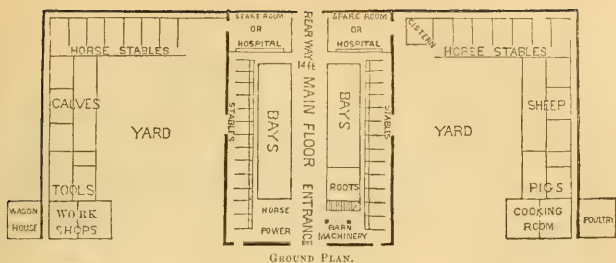
"The cost of this barn, built with rough boards, would be about eight hundred or nine hundred dollars; planed and painted, eleven hundred to twelve hundred dollars."

Attention is called to the fact that an enlargement of this barn, by increasing its length, would provide accommodations for any additional amount of land. All the principal doors should be suspended on rollers, instead of hung on hinges.



BARN FOR A WESTERN STOCK FARM.

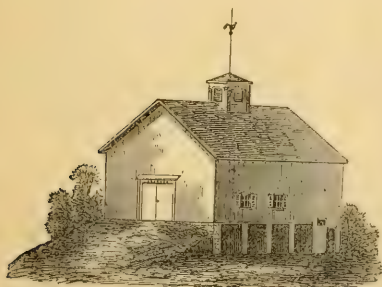
Professor J. W. HOYT, for many years Secretary of the Wisconsin Agricultural Society, gives the above perspective of a model battened barn with plan. It is large but admits almost any reduction. We have modified the plan to give each part a more definite purpose.



There are many who prefer this arrangement of the farm buildings in a hollow square. By such an adjustment the main part may be built first, and the wings be added as they shall be needed. Every part of the sheds is entered from the barn and the lawn by the open alley, which passes around the entire length in front of the animal, instead of by wading through the manure of the yard.

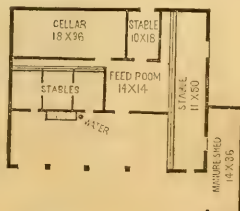
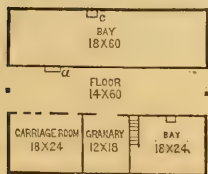
Says Professor HOYT: "True, a barn after the above model, with roomy bays, and stalls contiguous, with separate apartments for implements such as plows, harrows, planters, cul-

tivators harvesters, corn and cob mills, etc., with spare rooms also for the sick—a thing quite as important, proportionally, as that we have them for ourselves—and, withal, surrounded by sheds provided with mangers, and with 'lofts' for fodder can not be built without much labor and a considerable sum of money; still, if the farmer will wisely plan the operations of the year, economize time and retrench all unnecessary expenditures, there is not one in ten, who could not, in two years, surround himself with these convenient essentials, and feel that he has made so much clear gain."



T. S. GOLD'S BARN.

This cut represents the barn of T. S. GOLD, the efficient Secretary of the Connecticut Agricultural Society. The barn is 50 by 60 feet, 18 feet posts, and a basement, with manure shed 14 by 36 feet. Its length is east and west, basement opening to the south; land inclining to the southeast. The basement walls are two feet thick, and laid below the frost. Stone pillars, besides these walls, support the barn. The barn is covered with matched ceiling, and painted two coats of light yellow; roof, matched spruce and slated. The frame is heavily timbered, the roof having two sets of



purline plates, the upper ones supported by posts standing on each side of the barn floor. There are three grain scaffolds over the floor. The storage capacity for hay and grain amounts to over 80 tons, at 500 cubic feet per ton. The stables will hold 23 head of cattle, besides the open part of basement, 18 by 48 feet. The whole was built of the best material, and in the most thorough manner, and cost \$2,500.

The above is a cut of a barn built by Mr. MORRIS, near Fair Haven, Connecticut, who says of it:

"The arrangements are entirely my own, and I think very convenient. When you are in at any door you are prepared to go into any part of the building without going from under

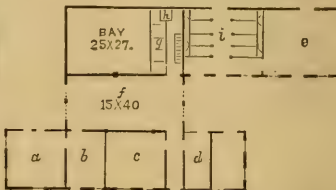


W. J. MORRIS' BARN.

cover. The barn-yard is exactly south of the barn—contains 4,800 square feet—the barn cellar 3,200 square feet. The barn-yard wall is built of stone, 60 by 80 feet, with gate on each southeast and southwest corners—is 4 feet high, 18 inches thick at top, 30 inches at bottom, laid in lime mortar, the top cemented."



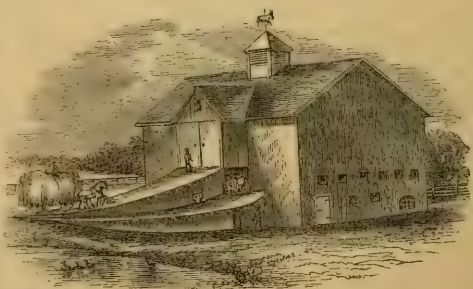
CELLAR.—*a*, hen house—*b*, calf pen—*c*, root bins—*d*, cistern under carriage house—*e*, underpinning to horse stable—*f*, cow stalls, with stanchions—*g*, pig pens—*h*, slide for cattle fodder.



PRINCIPAL FLOOR.—*a*, large tools and implements—*b*, room for cutting feed—*c*, bay—*d*, small tools—*e*, carpenter shop—*f*, threshing floor—*g*, grain bins—*h*, water closet—*i*, horse stables—*j*, carriage house.

The annexed cut, from *Rural Affairs*, represents the barn of ALFRED M. TREDWELL, of Morris Co., New Jersey. His fondness for horses and thoroughbred neat cattle, led to the erection of this barn, which, however, was not commenced until he had carefully inspected many of the best farms of Pennsylvania and other States. He was his own architect, and personally superintended the work from its commencement. The cut fairly indicates the situation.

General Dimensions.—The barn is 64 feet square. The first story, 8 feet high in the clear; second, 10 feet; third, 16 feet, and roof 16 feet. The walls of the first story are 20



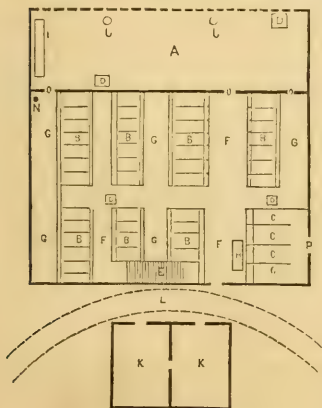
THREE-STORY BARN.

inches in thickness, the second story 14 inches, and the third 12 inches.

Materials.—The walls are of concrete—a mixture of broken stone, cement, sharp sand and water, and are built from the ground up-

ward without any special foundation; and strange as it may seem, the building has never settled perceptibly *one quarter of an inch*. A slight trench of the exact width of the wall is dug, the mixture is poured in, and the building is commenced. This hardens within a few hours, when boxes or frames are attached to the wall just completed, and another layer of concrete is poured in. While this is in turn hardening, the wall is started upon another side of the building, thus occasioning no delay. The proprietor says it is cheaper than wood or brick.

First Floor.—The first story of this barn, although nominally a basement, is nevertheless free from the disadvantages generally connected with cellars, as it is wholly above ground, and separated from the surrounding bank. The floor of this story is of concrete—readily cleansed, and never decaying.



FIRST FLOOR OR BASEMENT.

EXPLANATION.—A.—Shed 17 by 64 feet; being a portion of the main building, its roof formed by the story above.

B. B. B.—Cattle-stalls, varying in depth from 4 feet 8 inches to 6 feet 6 inches. Two-thirds of these stalls are provided with ordinary cattle-chains; the remainder have upright shifting stanchions.

C. C. C.—Stalls for farm horses, with entrance at P., thus separating them entirely from the horned stock.

D. D. D.—Hay and straw shoots.

E.—Stairway connecting first and second stories.

F. F. F.—Passageway in front of stalls.

G. G. G.—Passageway in rear of stalls.

H.—Feed bin for horses.

I.—Water trough.

J. J. J.—Pillars supporting rear of building.

K. K. K.—Root cellars, each 11½ by 20 feet, with 10 feet ceiling; total capacity 3,312 bushels.

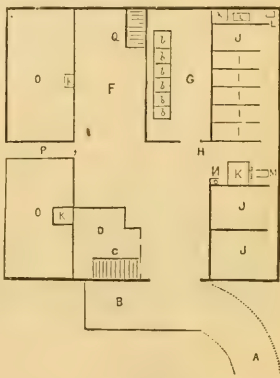
L.—Covered passageway between main building and root cellars.

M.—Cistern for liquid manure, receiving drippings from shed A and yard beyond.

N.—Penstock, delivering water from neighboring spring.

O. O. O.—Doors for horned cattle.

Second Floor.—The chief feature of the second story is its horse stable. The dimensions of the stalls, as indicated in the plan, are unusual; but long experience, and at times a very expensive one, has convinced Mr. TREDWELL that a stall four feet wide will invariably prevent a horse from casting himself, although giving him ample room to lie comfortably, and that one eleven feet deep renders it very difficult, if not impossible, for horses, properly tied, to kick each other. As a farther precaution, when the horses are all in for the night, a strong rope is passed through rings at the back of each stall, four feet from the floor, thus effectually boxing each horse, and, in case any become untied, preventing their leaving their own stalls and molesting their neighbors.



SECOND FLOOR.

EXPLANATION.—A.—Approach to this story, being on a level with grounds in front of the barn.

B.—Covered entrance.

C.—Stairs leading to basement.

D.—Harness room.

E.—Floor for harnessing and unharnessing horses.

F.—Light wagons and carriages.

G.—Granary 16 by 34 feet, with bins b, b, b, of various sizes, and filled by means of a shoot from above, where the grain is threshed.

H.—Sliding door leading to horse stable.

I. I. I.—Stalls 4 feet wide by 11 feet deep.

J. J. J.—Box stalls for stallions and sick horses.

K. K. K.—Hay and straw shoots.

L. L.—Trap doors for straw and manure.

M.—Box for mixing feed, into which empty grain spouts from floor above.

N.—Pump.

O. O.—Bays for hay—filled from third story.

P.—Passageway to side door.

Q.—Stairs to third story.

Third Floor.—In the third story (whose plan is too simple to require illustration), the great floor, 32 by 64 feet, with immense bays on either side, is a prominent and exceedingly valuable feature of the whole establishment, and furnishing ample room for many farm opera-

tions, which, for lack of suitable shelter, are oftentimes necessarily performed during extreme weather out of doors. Here are a railway horse power, a threshing machine, a circular saw, a grist mill, fanning mill, Daniels'

hay cutter, a cornstalk cutter and masticator, and scales. By nailing strips to posts supporting the roof, more or less of this floor, as the requirements of the season demand, can be converted into mows for storing hay or grain.

DONALD G. MITCHELL, author of "My Farm at Edgewood," contributes to *Rural Affairs* the elevations and subjoined plans of a milk barn—in large part an adaptation of existing buildings. It meets the most modern requirements of feeding and care.

Mr. MITCHELL says, in his description: "The boiler and fire room, it will be observed, are entered only by an exterior door, and steam is conveyed to the cooking tank through the wall. A manure cellar is under the



Manure Cellar.

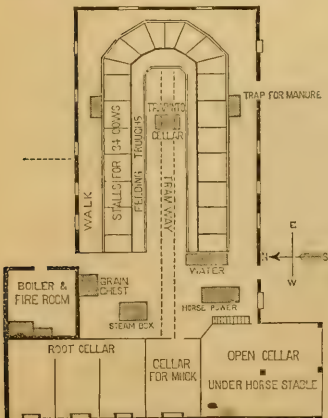
North Elevation.

Root Cellar.

MILK-DAIRY BARN.

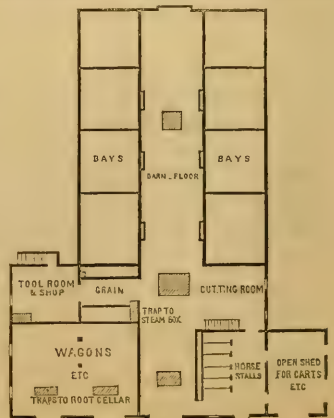


WESTERN ELEVATION.



BASEMENT.

eastern half of the stable, extending from a point indicated by the dotted lines on either side. A tram-way is provided, leading down the center of the stable, for the distribution of food, and for the transport of muck from the cellar, partitioned from the root cellar for that purpose. The tram-way car should be furnished with a movable box for cooked food, another for muck, and a third and larger open frame for the reception of green fodder dropped through from the barn floor above. Water should pass in a trough—indicated by the two



MAIN FLOOR.

lines within the feeding boxes—completely around the stalls. This trough should be covered to exclude dirt, and provided with traps against every manger—which traps the cows will easily learn to lift with their noses. The gutter for liquid manure may be made to discharge at any desired point into the cellar below. The upper floor is simply arranged, and will explain itself, when examined in connection with the basement and the elevations.

"The farther trap upon the floor is for the discharge of chaff or muck, if desired, directly through the stable to the cellar below; on either side, under each bay, are indicated openings, through which the hay, when necessary, can drop immediately into the feeding trough; the two farthest to the east, and the two westernmost, serve also as ventilators, being joined at the peak, for connection with the exterior ventilators shown above the roof.

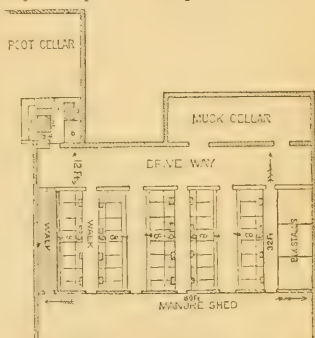
"An exterior communication with the workshop above the boiler room, is not shown in this elevation, but indicated in the ground-plan; it would be better, however, for the stairs to descend upon the north side.

"The western front may be made much more effective, architecturally, if desired. I have consulted simplicity and economy only in the plans. The space to the right of the horse stable (marked 'open shed' in the ground plan and by error represented with door in the elevation) might, if desired—by glazing its southern front—be converted into an admirable poultry house, communicating with the open cellar below; or the cellar itself, with its southwestern frontage, would serve well for such purpose, while a portion of the space above could be reserved for nests or roosts.

"If a bull is kept—and unless a near one is available, such animal should be kept—quarters might be provided for him in the horse stable, or in the cellar under the southern wing. There is no provision for young cattle, as none are supposed to be reared. Indeed, the plan has been arranged simply in view of the ordinary wants of a milk-farmer. I by no means present it as a model plan, but as offering a great many conveniences—securing great economy of labor—great compactness and opportunity for full and free examination of all the animals."

The ground plan below represents the milk-barn built by the WELLES brothers of Wethersfield, Connecticut. It is worthy of study. The ground on which it is built slopes moderately toward the east. This decline makes the manure-shed two or three feet lower than the

concrete floor of the stable. Before this barn was erected the cows were stabled in the root cellar, the basement of the hay barn. By carefully noting the decrease of milk from various causes, these farmers were convinced that the noise of the usual farm industries carried on over the stable, was the cause of considerable daily loss. When threshing, the falling off was as much as a quart to each animal. This showed them the advantage of keeping their dairy in a separate building.



MILK BARN OF WELLES BROTHERS.

ROOT CELLAR.—No. 1, Engine. No. 2, Boiler. No. 3, Tank for Milk. No. 4, Chimney. No. 5, Water Trough. No. 6, Box for Steaming. No. 7, Manure Gutter. No. 8, Stable. No. 9, Water Trough.

Mr. WELLES says that in arranging his dairy-barn, he had five ends in view:

"1. We desired to economize labor in all the various operations incident to the storage of the fodder and care of the stock.

"By referring to the plan it will be seen how well we have succeeded.

"2. To secure perfect quiet for the cows.

"This is done by giving them a room where they are not disturbed by any business except the necessary attendance at morning, noon, and night.

"3. An abundance of light and fresh air, by means of large windows on three sides, three ventilators, and making the room ten feet high 'between joints.' The heat from the animals keeps the temperature up to '46° above zero in the coldest weather.

"4. The buildings must be kept perfectly free from all odors arising from the manure. For this, the floor is of cement, the droppings are every day mixed with dry peat, and a shed built for the reception of the compost.

"5. As the use of lanterns is necessary in the winter, the danger from fire, by accident or

carelessness, is reduced to a minimum by taking away all necessity for going into the hay barn with a light, and by the cement floor."

The cow barn is 80 by 32 feet, with 22 feet posts. The upper floor is used, in Winter, for storing meal and corn; in the Summer, for drying garden seeds. The basement is ten feet high, with a covered driveway, twelve feet wide, on the west side. The north and east sides are lined, and the space filled in with shavings. The floor is of cement throughout. The stalls are thirty-two inches wide, five feet, five feet six inches, and five feet nine inches from the gutter to the manger. The gutter is one foot wide and ten inches deep. The mangers are two feet in width.

The partitions extend from the gutter to the front of the manger, thus keeping each cow separate. Water is supplied in cast-iron boxes, through galvanized iron pipes, one box serving two cows.

By employing farm hands to do the rough work, and purchasing their materials at moderate prices, they were able to put up this structure for something over \$2,500.

Basement Wall.—A correspondent of the *Prairie Farmer* writes: "After much botheration and examination of authorities, I came to the following conclusions, and built accordingly: A wall against a bank eight to ten feet in height, requires a drain under it from two to three feet in depth, with proper inclination, and filled with small stones. Base of the wall three to four feet, and battened on the outside to width of the barn-sill at the top; laid in lime and mortar, with a little—say one-fourth part—of water cement mixed with them, otherwise if the hill above is pretty steep, the water will ooze through the earth and the wall. It did so to mine, and I had to dig the earth again from the back of the wall, and cement it all over. See that the *back* of the wall is laid up smooth, as well as the front, so that the frost won't get hoid of the uneven edges of the stones, and use them as a lever to pry up the wall. To further protect the wall and keep it dry, and the occupants from suffering from disease produced by dampness, put a drain the length of the wall five or six feet above it, to carry off the water from the hill. Have windows in every side, double on the north and west, and the inner ones arranged to lift and hook up."

Modern Improvements.—A writer in the *Rural New Yorker*, in view of the invention of machinery for pitching hay and grain by horse

power, advocates the building of higher barns than those of the old style, which were built low on account of the difficulty of pitching to the top of a mow with a hand fork. With the power fork, height is said to be no objection, but rather a convenience. Fourteen to sixteen feet was the usual height of posts for a hay and grain barn, and with this height it required a tall and stout man with a long-handled fork to "pitch over the beam," and great scrambling of the boy on the mow to stow away so as to fill up under the roof. With the power fork the product may be carried to any desired height with a trifling additional effort.

For a large barn, it is more convenient to have two floors across the barn, than one floor through the length of it. You can drive in and out with more facility, especially when you are carting with two or three teams, and you have more convenient sized mows. It is not so well to have very large hay mows, and, as on most farms, there is considerable variety in the quality of the hay, we want it put into several different mows, for the different kinds of stock, and to be fed out at different times in the Winter. Also, on a farm where grain is raised, one floor is for threshing, and a part or the whole of the other can be filled with hay or other fodder, if necessary, after the rest of the barn is filled.

It is very important that you have convenient passage through every part of the building; no groping, no crawling through narrow passages, no climbing naked posts, no narrow, dark staircases. There should be plenty of doors and gates, easily opened from either side. It is desirable to be able to go from the house to the barn without going through the cattle yard, and also to go by a dry, clean walk.

Stables should always be built high—especially horse stables—for ventilation and safety from injury. Low doors and low beams in stables are the most frequent cause of poll-evil in horses. With a low stable, some injury to the horse's head is almost sure to follow.

Ventilation.—If a barn be not well and thoroughly ventilated in its bay, floor, and stables, it does not answer the purpose of its construction. A shed, loosely slatted, and open on one side, is better for cattle than an airtight stable in which carbonic gas and ammonia accumulate, rendering the air fetid. Cattle and their excrements exhale gases unfit to breathe, and it is only when there are open windows or other ventilation enough to carry these off, that the stock can remain in health. Ventilation is

as essential as warmth, and it is not difficult or expensive to combine the two. In England a temperature between 55° and 60° has been found most conducive to the health and fattening of animals. The stables must also be kept dry, admit no dripping water through the walls. Cattle will do better out of doors than in a damp basement. The surface of the ground should slope away on every side of the building. There should be plenty of windows on the wall side, as well as in front, for light and ventilation. The wall should be pointed—at least the upper part—that no currents of air get through.

Light.—Mr. WILLARD pleads for light in stables: "The ill effects of excluding the light from horse stables, as is known by the sad experience of many, has caused blindness in valuable animals, and yet farmers are often ignorant of the true reason, and keep on in the same old routine. The fact is beyond dispute, that sunlight has an important influence on the health of the human as well as the brute creation. Even vegetable life that is excluded from the sun's rays, is puny, sickly, and will not fully mature. In Paris, diseases of various kinds are successfully treated with sunlight alone. The hospital is constructed with glass roof, so as to secure a full share of the sun's rays, and the patients are stripped and lie exposed to sunlight. They call it taking a "sun-bath," and however simple this treatment may seem, it has effected some remarkable cures. We need not stop to inquire into the mysterious agency of sunlight, or its potency in preserving health. The facts and the law are plainly indicated, and it is for us to make use of them in such way as will contribute to our happiness and prosperity. We believe, therefore, that the health of animals will be promoted by having a large share of sunlight, and that stables should be constructed with this view." The London Horse Book insists upon the necessity of plenty of light, with much earnestness.

The Largest Barn in New York.—X. A. WILLARD, of the *Utica Herald*, gives the following description of a barn recently erected on the farm of LYMAN R. LYON, at Lyon's Falls, in Lewis county. His farm consists of eight hundred acres of cleared lands, and he keeps a dairy of ninety cows. "The barn is two hundred and twenty feet long by forty-eight broad. It sits upon a wall twenty feet high, which contains a thousand yards of masonry. The drive-way is thirty feet above the bottom, and twenty-one wagons can be unloaded at once from the

barn floor. The mows on either side of the drive floor have capacity for holding six hundred and fifty tons of hay before you get above the level of the barn floor, and it is proposed to have machinery driven by water power for catching up the whole load and dumping it into the bays at once. The stables in the basement will hold two hundred head of cattle, and near by is an immense muck bed, where any amount of this material may be readily had for mingling with the manures or using in the stables to absorb the liquid manures. There are thirteen ventilators running from the stable to the top of the building, the height of which to the peak is eighty feet. In the basement it is proposed to have a root cellar and machinery for doing all the work of threshing, cutting roots and feed, carried by water power which is conveniently near. This barn cost in the neighborhood of \$12,000, and when completed, as to machinery, etc., will probably be the most interesting barn structure in the State."

Horace Greeley's Barn.—Mr. GREELEY says: "My barn is a fair success. I placed it on the shelf of my hill, nearest to the upper (east) side of my place, because a barn-yard is a manufactory of fertilizers from materials of lesser weight, and it is easier to draw these down than up. I built its walls wholly of stones gathered or blasted from the adjacent slope, to the extent of four or five thousand tons, and laid in a box with a thin mortar of (little) lime and (much) sand, filling all the interstices and binding the whole in a solid mass, till my walls are nearly one solid rock, while the roof is of Vermont slate. I drive into three stories—a basement for manures, a stable for animals, and a story above this for hay, while the grain is pitched into the loft or scaffold above, from whose floor the roof rises steep to a height of sixteen or eighteen feet. There should have been more windows for light and air; but my barn is convenient, impervious to frost, and I am confident that cattle are wintered in it at a fourth less cost than when they shiver in board shanties, with cracks between the boards that will admit your hands. No part of our rural economy is more wasteful than the habitual exposure of our animals to pelting, chilling storms, and to intense cold. Building with concrete is still a novelty, and was far more so ten years ago, when I built my barn. I could now build better and cheaper, but I am glad that I need not. I calculate that this barn will be abidingly useful long after I shall have been utterly forgotten; and that had

I chosen to have my name lettered on its front, it would have remained there to honor me as a builder long after it had ceased to have any other significance."

Pig-Pens.—Every man who keeps a pig needs a pig-pen, and every pig-pen wants a building attached to it, large enough to house the pigs in "cold and stormy weather," to set a kettle for cooking their food, and to store their corn, roots, etc., overhead. (It seems hardly necessary to say that grain for family use, or for market, should never be stored where it can absorb the effluvium of the pig-pen, but some farmers still indulge the filthy habit). The cooking may be economically done with



PLAN OF PIGGERY.

PRINDLE'S Cauldron, or any other that is as good. The accompanying cut represents a convenient pig-sty; but there should be a pen outside, where the animals may disport in pleasant weather.

A farmer in Niles, Michigan, writes: My troughs are one foot wide, by eight or ten inches deep; and in front of each trough is a ladder-like arrangement, with spaces twelve inches wide between each round, for each hog to put his head through to eat; (hogs when weighing 250 or 275 pounds, can easily eat through a twelve inch space; if heavier than this, would probably need more room). This plan I have tried for some years and find it does well, preventing all fighting during feed time, and giving the weaker ones an equal chance with the stronger. On each ladder is swung a trap-door, which may be fastened down with a bolt or button, to keep the hogs out until the feed is in the trough. In the corner of each enclosure is a box made seven feet square, and about seven inches high, for them to lay in, in which, if straw is put, they will always keep clean. I have used a pen something on the plan of this, but it is now too small for my purposes. This will easily accommodate forty hogs.

I will add this rough estimate of the cost of such a building in 1865:

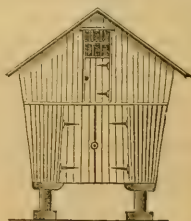
2,160 feet two-inch plank for flooring, at \$20.....	\$43 20
1,320 feet inch boards, for siding, at \$20.....	26 40
9,000 shingles, at \$5 per thousand.....	45 00
Sheeting-boards, rafters, and joists.....	25 00
Carpenter's work, including hewing timber.....	60 00

Total.....\$200 00

The cast-iron pig troughs are a great improvement on the common mode of construction of wood; they are indestructible by teeth of time or hogs, are easily kept clean and always "right side up." A plank or stone floor is essential for the sleeping apartment at least, for the sake of cleanliness and ease in throwing out the manure, a "chore" which should be attended to daily.

Corn-Cribs.—It is common, throughout the younger States of the West, to leave corn all Winter without proper housing, exposed to the elements. The *Prairie Farmer* thus speaks of the practice: "The condition in which a large portion of the corn crop of 1864 reaches market should convince all that it is a useless waste of money to leave corn exposed to the snow and rains of Winter and Spring. Make a water shedding of some sort for the corn-cribs. Even if corn is at a low price it makes a material difference whether it sells for No. 1, or stands No. 2 and rejected. One of the most absurd things in farming is to labor the season through to produce crops, and then throw away a large share of their value by thoughtlessness and negligence." A good corn-crib is almost as necessary on a farm as a good barn. It should be so constructed that the corn will not be at all exposed to storms, and also so that it will not mold, when not thoroughly matured.

A thrifty farmer writes to the *Country Gentleman*: "I give you a rough sketch of a corn-house, built three years ago, and there has not



CORN-CRIB.

been a rat or mouse in it yet. You will see it is not connected at the bottom—consequently, we use the gravel for a floor to drive in on—the only way a crib can be built rat and mouse proof. It stands on 8 pillars, 4 on each side. They are 8 inches diameter, 2 feet 10 inches long—16 inches upper end is tinned—standing on stone blocks 2 feet square by 6 inches thick. On top of each post are saddles. It stands as

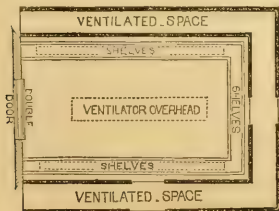
firm as if it were on a wall. The ends are boarded up and down, with small rib slats over each crack. The sides are covered with slats $2\frac{1}{2}$ inches wide, with $\frac{3}{4}$ -inch cracks. They are put on up and down, from the projection to the under corner of the sill. Inside slats run the other way, horizontal. There is a door in the center of each crib, made of slats, to put corn



GROUND PLAN.

in, to the depth of 5 feet. Then it is handed up from the wagon through the scuttle in the center of the upper floor, which is laid with slats except one end 9 feet square, which is a tile floor for a bin to hold shelled corn. The cribs extend up to the roof, with 3 doors to empty the corn (three on each side.) Stairs hung with a hinge so as to swing up and fasten; when down the lower end rests on the walk. The corn will not mold, if the floor is laid with slats 3 inches wide, put down with $\frac{3}{4}$ of an inch open space between each, to allow a free current of air upward. Such a house, 20 feet long, 7 feet wide, and 7 high, will hold five or six hundred bushels in the ear.

A Dairy Room.—A farmer asks the *Cultivator* how to build "a milk room cheap, that will give the most cream in hot weather." That journal replies that the cheapest milk room, in the long run, is one where the temperature may be so completely controlled that the cream may have sufficient time to rise, and by which the largest amount of butter may be



MILK-DAIRY ROOM.

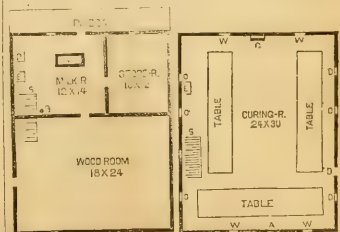
obtained from a given quantity of milk. The figure given above exhibits the plan of a dairy room for a moderate farm. The dotted

lines on each side under the shelves, are the openings from the cellar, and the ventilators consist of boards with hinges, closing or opening the spaces precisely like a trap-door. They should be about ten inches wide. Overhead there is another ventilator, closed by a similar trap-door, six or seven feet long and a foot wide, opening upward to allow the heated air to pass out, which it does by its specific lightness. At the same time the cold air flows upward from the cellar to supply the space, in the same way that water rises to fill a pump when the air is drawn out above. Elevating sticks with holes or notches enable the attendant to raise or lower these ventilators to any desired degree. If the cellar is not sufficiently cold, keep a small vessel of ice in it, which will reduce the temperature as low as necessary. A ventilated space of one or two feet wide extends around three sides of the room and prevents the heating so often resulting from confined air in the walls. The double entrance door is placed in the fourth side, the outer one being tight to exclude the hot Summer air, and the inner of wire gauze for the ingress of cool night air when necessary. The shelves are not flat boards, but formed of two narrow strips of inch boards on edge, thus admitting free circulation of air on every side of



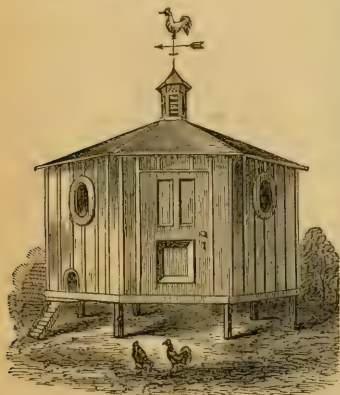
the pans. The accompanying cut shows the shelves as completed. A space is left between them for the side windows. The strips are about one by two inches and eight inches apart, or with six inches of clear space between them.

The same paper gives a plan for a convenient cheese house. The annexed cut shows the



the cheese to the curing room above, S the stairs, and B the cistern pump. The plan on the right is the upper or curing room, O O O being the openings with wickets, C the chimney, E the elevator, D door for delivering the cheese, A alley three feet wide, and W windows. The plan was furnished by X. A. WIL-LARD, who had a dairy of twenty-five cows on a good hundred acre farm, averaging four acres to each cow. The product in 1861 averaged 650 pounds per cow, and in 1862, 600 pounds per cow—that being a less favorable season.

Poultry House.—The cut below represents the elevation of a pretty and convenient poultry house, for which we are indebted to "*The American Poulterers' Companion*," published by the HARPERS:



OCTAGON POULTRY HOUSE.

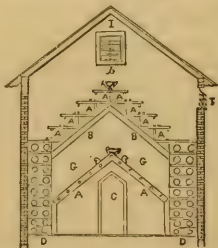
It is designed to accommodate from twenty-five to thirty common-sized fowls. The octagon was preferred on account of economy, as it takes less materials and labor to enclose a given number of feet in an octagon than in a square or oblong form. Where different varieties of fowls are to be kept separate, the apartments may be enlarged, and the yards radiating from each square of the building. The object of placing it on piles was to prevent the encroachment of rats, mice, and other vermin. Rats are particularly annoying, as they not only devour the grain, but suck the eggs and kill the young chickens. Where fowls were fed from a trough on the ground, we have

known rats to contend with and even drive the fowls from their food.

This building is ten feet in diameter and six and a half feet high. The sills are four by four, and the plates three by four joists, halved and nailed at the joints. It is sided with inch-and-a-quarter spruce plank, tongued and grooved, the joints battened on the outside. No upright timbers were used. The floor and roofing are of the same kind of plank. An eight-square frame, eighteen inches diameter, supports the tops of the rafters, leaving an opening of ten inches diameter, over which the cupola is placed for a ventilator. In place of the cupola, a vitriolized stone chimney, such as are used sometimes on cottages. The piers should be either cedar, locust, or chestnut, and at least two feet high, and set on flat stones.

The internal arrangement is as follows: A post may be set in the center, under the cupola, for one end of the roosts to rest on, the other end to the wall. The first or lowermost one two feet from the floor, and the others eighteen inches apart, and rising gradually to the top in a spiral form, six feet from the floor. Underneath these roosts is a board floor, on an angle of about forty-five degrees, to catch and carry down the droppings of the fowls. This arrangement renders it much more convenient in cleaning out the manure, which should be frequently done—at least once a week. The space beneath this floor is appropriated to tiers, 18 inches wide, 18 inches deep, and 18 inches high.

A correspondent of "*Rural Affairs*" furnishes



SECTION OF HEN HOUSE—TWELVE FEET SQUARE.

- A. A.—Joists placed rafter-wise, 3 by 4 inches, in which are holes for the poles for perches, which in this section are seen endwise.
- B. B.—Similar joists, which support the nests a a a, etc.; the series of these also being seen endwise.
- b.—Perches for the young chicks.
- [The space between the nests A, A, and the roosts B, B, is three or one and a half feet.
- C.—Glass door for entering beneath the roosts, for clearing out guano, etc.

D. D.—Places of doors, opening next the stairs on each side. These stairs serve to ascend to the nests above, and also contain themselves two boxes for nests between each step, making 36 nests in the stairs, the openings to which are represented as round holes in the engraving. Those, with the upper nests, make 12 in all, each one foot square. There are 12 perches, each 12 feet long, accommodating easily 144 fowls, allowing each one foot. Perches may also be made under the stairs, sufficient for 200 fowls in all.

I. I.—Ventilators, which should be in the south and east sides. These will admit light enough for the laying and setting departments.

the foregoing design for a poultry house. He says: I built one last Summer, of brick, on a hill-side, with an eastern aspect, having an underground room, which is cool in Summer and warm in Winter, and which my fowls having tested and highly approved, I now recommend as just the thing. I have seen more expensive and curious arrangements, but they proved to be inconvenient or were wholly rejected by the fowls. By constructing the nests in this manner, they may be easily reached, and setting hens and young chicks cared for as they should be to insure success. I have a dove-cote in the roof, which is also convenient and approved by the pigeons.

Ice House.—Ice houses are no longer expensive luxuries. They now belong to the cheap comforts of every householder, and no farmer should be without his Summer supply. It is equally valuable to keep the meats and dairy sweet, to make ice cream, to cool our drinks and our custards. Ice can be made a famous auxiliary to the comforts and luxuries of the table of the rich and poor, especially in the rural districts, where other luxuries are not so plenty as in cities. A glass of iced milk is a greater luxury and more wholesome Summer beverage than the choicest wine, or the best distilled cup of tea or coffee; an absolute improvement, in fact, upon pure cold water.

The ice house should be located within two or three rods of the house, where it can be connected with the dairy—by partitioning off a little room for the butter, if not otherwise. The drippings will furnish an unfailing supply of water for the poultry, if they have no other convenient resort. The building may be made an ornamental appendage, by surrounding it with morning glories, or some perennial climbers, to run up and help to shade its roof.

Many farmers deprive themselves of the advantages of ice in Summer from the supposed expense of constructing houses to hold it, and the difficulty of preserving it. Such should understand that there is little expense and no mystery about it. A good ice house may be the very cheapest structure. A board or slab shanty will answer an excellent purpose; and

with a good supply of sawdust, can hardly fail to keep ice well.

A building of twelve feet square and eight or nine feet high, is sufficient for the wants of the most exacting family. It may be a frame building, entirely above the surface of the ground, and better if supported on posts elevated a few inches, to be certain of good drainage, and to allow a free circulation of air under it. We have never seen ice better protected than in just such a rude building, without any internal shell. The square blocks of ice—and it is necessary that they be sawed square so as to fit tightly—were laid up in a solid cube in the center, on a foot of sawdust, and a space of a foot all around the sides closely packed with sawdust. The top was similarly covered, an opening of several inches in the horizontal boarding around the upper part of the building serving for thorough ventilation.



ICE HOUSE.

The above engraving represents a building of a similar character, intended to be used for this purpose. The ice is passed in from the loaded wagon or sled through the door at the end.



GROUND PLAN.

Plan of the interior, showing the ice in blocks surrounded with sawdust, D being the door at the end. A rough loosely laid floor is best; allowing complete drainage through the stratum of sawdust which rests upon it. A house of this kind, large enough to keep ten or twelve tons of ice, may be built for \$12 or \$15 where the price for lumber is moderate.

An Iowa farmer keeps ice the year round by very simple protection. When he began, he selected the north side of his barn, threw down a foot of cornstalks and trash fifteen feet square, and covered with a foot of sawdust. The ice was hauled out of the river and placed up ten feet square, eight feet high, pounded ice being filled in the cracks. The pile of ice was left

standing out a month. He then built a frame of rough two by four inch sills and plates, boarding it up rough, leaving two feet space all round, which was filled with sawdust. A shed roof, with some prairie grass thrown on it, to keep it perfectly tight, was put on, and between it and the ice filled with sawdust. The whole did not cost ten dollars, and has answered admirably as an ice and milk house and place for keeping fruit and butter. The same sawdust will answer for years.

And, finally, here is a still simpler way: Take two or three sugar hogsheads, always to be had of the merchants at half the cost of the material composing them, and selecting a convenient place, place them close together upon bearings laid upon six or eight inches of straw or coarse litter. Now, during the freezing weather, as leisure occurs, pour in a few inches of water at a time and let it freeze solid; then pour in some more, and continue to replenish at intervals until the hogsheads are full and frozen solid. Then form, with a few stakes and strips of board, a roof and a side entrance, covering the whole with a load of clean straw or forest leaves, packing closely. As the ice is needed during the Summer it can be chipped out with a sharp pointed iron and a mallet. The farmer who tries this once will not be likely ever again to be without the cheap luxury of ice in summer time.

Cisterns, Pumps, etc.—Every house and every barn, where much water is used, should have a cistern and an effective pump attached, driven either by hand, horse-power, or windmill. In the driest parts of our Western prairies, enough water falls in the course of a year on the roofs of the farm buildings, to meet the average aggregate wants of both families and stock.

Size.—The quantity of water that falls annually on a given area of roof is usually underestimated. More than four hundred hogsheads fall every year on a thirty by forty foot roof; and the one hundred feet square of aggregate barn-roofs which many farmers own, will furnish seven thousand barrels. A hogshead holds about sixty-four pailfuls, and so the four hundred hogsheads that would fall on the thirty by forty foot roof would be sufficient to water twenty head of stock the year round, even if they should obtain no water elsewhere, allowing to each four pailfuls a day. If a cistern is to be drawn from daily throughout the year, it need not, of course, be so large as if intended

for filling in the rainy season and using only in time of drought.

Having fully settled the capacity required for cisterns, it is next desirable to ascertain the required dimensions. The following is a simple rule for this purpose: Find the depth and diameter in inches; square the diameter and multiply the square by the decimal .0034, which will give the quantity in gallons for one inch in depth. Multiply this by the depth, and divide by $31\frac{1}{2}$, and the result will be the number of barrels the cistern will hold. By this rule it will be found that a cistern ten feet in diameter will hold $18\frac{1}{2}$ barrels for every foot in depth, and if ten feet in depth, it will hold over 180 barrels.

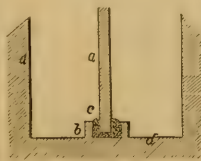
For each foot in depth, the number of barrels answering to the different diameters are:

For 5 feet diameter.....	4.66	barrels.
6 ".....	6.71	"
7 ".....	9.13	"
8 ".....	11.93	"
9 ".....	15.10	"
10 ".....	18.65	"

By the rule above given, the contents of barn-yard cisterns and manure tanks may be easily calculated for any size whatever.

Mode of Construction.—A house cistern should have a filter, for it is cheap, and on some parts of the prairies almost indispensable. The most inexpensive may be thus constructed: The cistern may be divided by a partition-wall of soft, porous brick through the middle, and near the bottom of the wall a box of sand and charcoal for the water to filter through. Into one of these apartments the water should be conducted from the eaves, but should be drawn out as used from the other; the one into which the water falls being a few inches deeper, that all impurities and sediment may settle to the bottom, and not be allowed to get into the other apartment, by which process there will always be clear water for drinking, culinary, and all domestic uses.

Or, the filtering cistern may be made as in the annexed plan, with a partition wall (a)

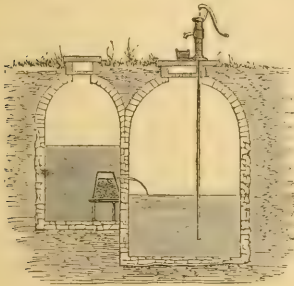


pierced at the bottom with several apertures.—A wall (b) on each side of the partition affords a space to be filled with pure broken charcoal,

alternating with clean gravel. The water first enters one compartment of the cistern, and is pumped out of the other. A level is, of course

maintained on both sides, without a violent current through, the filter, or danger of overflow in heavy showers. But it is difficult to change the charcoal or to restore it, if displaced, except when the water is low. A plan, better on some accounts, is to have the rain enter the cistern through a cask or box, sunk in the ground, having a pipe from its bottom, the orifice of which is covered by wire gauze, or a coarse sponge, with charcoal kept in place by gravel over it.

Or, the whole may be made a little more substantially, as shown in the accompanying cut. The *Country Gentleman* says: "We would not recommend plastering on the earth, but greatly prefer building a good stone wall, or one of hard-burnt brick, laid well in the mortar, and afterward plastered with three coats." A cistern requires the very best quality of hydraulic cement, and the cleanest, sharpest sand; and it should be laid on by the best mason, paid by the day.



HOUSE CISTERN.

Water is sometimes filtered by laying a network of porous cement pipes in the bottom of the cistern. When the filter is effective, the water comes up cold, clear, and sparkling, as from a common well, and as much better as can well be imagined.

The most important argument in favor of the habitual use of cloud water, next to its being accessible where no other water exists, is to be found in its healthfulness. Hard water, for cooking and drinking is bad. Rain water is both a restorer and preserver of health, as well as a preventive of many diseases. This important fact will not be unheeded by the wise and thoughtful in arranging and furnishing comfortable and tasteful dwellings, whether in city or country, in destitute or watered sections, in shop or stable; for in this respect, as

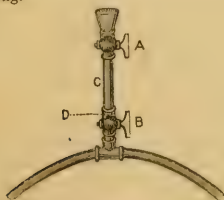
well as for convenience, it is everywhere alike valuable and pleasant.

Protection from Frost.—When a cistern for stock is provided for Winter use, it should be placed, if convenient, under the barn and sunk well into the ground, and always arched over, and a neck turned like the neck of an enormous gourd, so that it will admit of no drainage from the stables or yard; and if necessarily out of doors, it should be well banked over with refuse hay, straw, and coarse manure from the stables, to keep the water as much above the freezing point as possible. And the pump may be effectually kept from freezing by building a large box or crib around it, reaching quite over the top and filling it with coarse manure, leaving an opening in one side, just sufficient for the handle to play in, and adding a continuation to the spout through the protecting mass. Freezing may also be prevented by winding the pump with hay ropes, or by letting the water out of the pipe when not in use, below the level of frost. If the cistern is built in the bank by the side of the barn, its position will generally obviate the necessity of a pump—the water being conveyed to the cattle troughs or stalls in a pipe kept above the freezing point.

Introduction of Spring Water.—Frequently the farm buildings are so located that water may be brought in a covered pipe from a well or a spring, or a stream, that comes to the surface on higher ground. In this case the conductor may be made of round tiles well cemented at the joints, or of lead pipe, or a continuous tube may be cheaply made of cement that will last an age. S. E. TODD describes the manner of making such a conductor: First he dug a narrow ditch about four feet deep, terminating in a bottom only four inches wide. Then he made the material of hydraulic cement and sharp sand, in the proportion of one part cement to three parts sand. A turned stick, one and a quarter inches in diameter and five feet long, very round, smooth, and straight, was required to make the water-course. The prepared cement was laid in the ditch about two inches deep, the rod laid on and pressed carefully down into it about half an inch, and covered an inch or two with cement and troweled off smoothly. The rod is allowed to remain a few minutes, for the cement to harden around it. About four inches has been left extending beyond the cement, to enable a person to grasp it and draw it nearly out of the first section, when another section is

formed around the rod, and so on to the end. As the cement sets rapidly there is little danger, if care is observed, that the orifice will be closed by the settling of the upper side. The rod may be turned in the orifice from time to time, to keep it detached. The earth must be carefully returned to the ditch, so as not to injure the pipe by dropping stones on it. Such a conductor will be found very cheap and durable.

Use of a Syphon.—Water may be carried over a small hill by the means of a syphon, without a pump, except temporarily to start it. The end of the pipe that delivers the water should be a little smaller than the rest. If the pipe be of good size, the water will probably move with force enough to keep the bend free from a collection of air; if it be small, or have slight velocity, J. P. JAY, of Mason county, Kentucky, recommends the adjustment of a vertical branch on the highest part of the bend, supplied with a funnel and two stop cocks, as shown in the engraving.



A SYPHON RELIEF.

To start the syphon, stop both ends and fill with water through the vertical branch; then turn the cocks so as to cut off communication with the air; open the upper end of syphon first, and then the lower end, and water will run freely. Now when air collects in the bend of the syphon, by opening the cock B the air will ascend in the pipe at C. Then close B, open A, and pour in water to fill the part C. In this manner the air can be taken out with little trouble. Care should be taken in joining the branch to the syphon that the end does not go inside at all. In case the branch might freeze, it may be joined at D with a screw so as to be removed.

The Drive or Tube Well.—This is an American invention, and has already wrought quite a revolution in some sections, in the methods of obtaining water. It consists simply of a gas-pipe, or similar iron tube, sharpened at the lower end and perforated just above it, driven perpendicularly into the ground, and attached

at the top to a pump. Considerable soil is drawn up at first, which leaves a cavity, or well, around the lower extremity of the tube, which remains filled with water at once clear and cool, of course below the level of frost. To protect the pipe against too great an entrance of earth, the perforated terminus is generally covered with a layer of wire strainer, and that covered with zinc, pierced with holes to correspond with the holes in the pipe, and soldered down tight. The pipe is driven down with a sledge-hammer, and a piece of tough wood is held on the top of the pipe to prevent crushing the thread.

The length of the pipe required will of course depend on the location and the soil—varying from five to thirty feet. In some places, as in quicksand, the drive-well seems to be almost entirely impracticable. If rock offers an impediment, the tube can be withdrawn in a few minutes, and tried elsewhere. On the whole, the drive-well is one of the most economical and convenient of our recent labor-saving contrivances.

Carrying Water Up a Slope.—Water may be carried up a moderate slope, either by force or suction, by driving or drawing. The hydraulic ram is one of the most popular and economical agents, and is now used in every State for this purpose. In some places water is thrown a mile by it up a grade of a hundred and fifty feet—one-eighth of the water that runs through the ram being lifted by the other seven-eighths. The hydraulic ram is adapted to almost any place, where there is a slight fall, and cost from \$8 (for a ram adapted to a brook furnishing 3 quarts to 2 gallons of water per minute—having a $\frac{3}{4}$ -inch drive-pipe, and $\frac{3}{8}$ -inch discharge) to \$150 (for one adapted to a flow of 25 to 75 gallons per minute, having a 4-inch drive-pipe and 2-inch discharge). B. DOUGLASS' is one of the best.

Water may be drawn up a small ascent by a suction pump, as illustrated by the following cut—the syphon being used to collect it in a



SUCTION PUMP.

reservoir, beneath the pump. *Explanation.*—Lay the pipe in the direction A B C D, or in

any other direction touching A C D. C being lower than A, water will not flow back to it. Lay below frost. A, spring—D, pump—dotted line, level.

How to Cleanse a Cistern.—Many persons who know how annoying the stagnant and odorous water of cisterns sometimes become, will be glad to know that it may be purified in a few hours by the use of two pounds of caustic soda. Concentrated lye may also be used with a good result. Either may be obtained of any druggist, and used moderately, the water will not injure clothing.

FENCES—THEIR COST AND CONSTRUCTION.

The Law of Fencing.—During the last fifteen years, our most intelligent farmers have earnestly agitated and debated the question, "Can not roadside and division fences be dispensed with? Am I bound to fence against other people's stock?" An affirmative answer to the first inquiry would effect vitally the farming interests of every State; it would cause a complete revolution in the methods long practiced in all sections of the country.

Cost of Fences.—Since the examination began much light has been thrown upon the question. Farmers have been startled to discover that their fences cost more than all their other expenses, including taxes. A writer in the Illinois Agricultural Report for 1864 says: "That the fences of the United States have cost more than the houses, cities included; more than the ships, boats, and vessels of every description, which sail the ocean, lakes, and rivers; more than our manufactories, of all kinds, with their machinery; more than any one class of property, aside from real estate, except, it may be, the railroads of our country." This may seem like an exaggerated statement, but a little estimate will show that it is not so extravagant as would at first appear.

The first cost of the fences of New York State was between one hundred and one hundred and fifty million dollars. ROBINSON gives it as \$144,000,000. Assuming this to be approximately correct, and estimating the first cost of the fences of the other States on the same basis, we have, as the total first expense of the fences of the whole country, the vast sum of \$1,296,000,000!

This requires to be renewed once in ten

years—giving \$129,600,000 as the annual cost, to which should be added, however, at least half as much more for repairs, making the aggregate of \$194,400,000 as the annual national expense—a sum, we believe, below the actual figures, yet quite beyond comprehension. NICHOLAS BIDDLE estimated that the "fence tax" of Pennsylvania was ten million dollars a year. General JAMES T. WORTHINGTON, of Ohio, says that there are 18,000,000 acres of land in Ohio enclosed with 45,000 miles of fences, at a prime cost of \$115,000,000, and at a yearly expense for repairs, etc., of \$7,680,000.

If roadside and boundary fences can be dispensed with, half the cost of fencing will be saved. That cost is now an annual tax of \$1 50 on every acre of improved land in the United States—the "fence tax" being twice or thrice as great as the aggregate of the State and local taxes combined.

Why can not a large portion of this outlay be saved for some profitable investments? Every dollar rescued from fences may be added to productive wealth. Fences are dead capital; they pay no interest, and are a constant drain upon the pocket. As Mr. GREELEY says: "We poison our land with fences; they are a shelter for weeds, as well as a vast and useless expense." The indirect waste which they inflict is almost as great as their direct cost. A Virginia zigzag fence occupies five acres for every hundred enclosed—thus imposing a five per cent. tax on the market value of the soil—a tax that would be felt to be oppressive if it was for the payment of the national debt, instead of to shelter a growth of weeds.

Shall We Fence Stock Out or In?—There is no doubt that our people now expend four times as much money to fence stock out as would be required to fence it in. Our present custom, which commands universal fencing, is the worst blunder the practical American people ever made. Enterprising and original in many matters, they are here following slavishly, generation after generation, the habit of the earliest English colonies—following it, though very expensive and very inconvenient, because it is "the good old way." Europe has learned a more rational method. There are ten times as many fences in Illinois as there are in Germany; and Dutchess county, in New York, has more than all France. In France, Germany, and Holland farmers hold their lands in common, with only narrow paths between.

The continental system of having few or no fences is evidently the best; and even exclusive

England is slowly adopting it. America will inevitably follow, for economy, taste, thorough tillage, fair play, and good sense command it, and the time will come, before many years, when the absence of farm fences will be a sign of progressive culture.

The immense cost of sustaining fences; the inconvenience of having them always in the way of thorough tillage, and of easy ingress and egress to the premises; the impassable snow-drifts accumulated by them; the shelter they afford to weeds and briars; the protection they afford to many of the worst animal pests of the farm, and their unsightly appearance generally throughout the country, as the receptacle of stone heaps, piles of brush and dead trees, to say nothing of the countless acres rendered worse than useless by their occupancy, would seem sufficient reasons for disposing of fences wherever not indispensable for purposes of pasturing.

Effect on the West.—The necessity of enclosing with a fence is the bane of Western farming. A man buys a quarter section, and is compelled to make either one or two miles of fence—the quantity depending on the circumstance whether he “joins fences” or not. He may wish to raise wheat and keep no stock; but he is compelled to fence just the same, to defend himself against his neighbors’ cattle. If they have not more than fifty head, it will be cheaper for him to go upon their farms and enclose their pastures, than to build his own boundary fence.

The squatter finds to his amazement that his fence will cost five times as much as his land did—not less than four hundred dollars a mile. He has teams, tools, and boys sufficient to raise fifty to a hundred acres of wheat, but not having money enough to fence it, is driven to the alternative of renting of others, and letting his own rich land lie idle. Farmers can about as well afford to pay ten dollars per acre for a farm, and be obliged to fence only enough to restrain their own stock, as to pay five dollars per acre, and be compelled to fence against the stock of the State.

Many men rent all their lives, who would buy land and pay for it, were it not for the serious expense of fencing. The writer in the Illinois Report, already quoted, says: “About three-fourths of all the ‘cussin’ in Illinois may be fairly charged to the practice of fencing crops, rather than stock. Had Illinois passed a law thirty, twenty, or even ten years since, that stock should be fenced, or otherwise taken

care of by its owners, I do not believe there would be an acre of good prairie uncultivated in the State. I know this is a strong statement when we think how many acres of the best land in the world are yet ‘lying out,’ but those who have lived in the State but the last ten years have seen miles of prairie come under the plow right around them, even under the crop-fencing incubus. During the wheat mania of a few years since, a large portion of the prairies of central Illinois would have been turned bottom-side up, had it not been for the expense of fencing. * * * We have spent millions of dollars in Michigan pine to keep our corn and wheat from going off our farms to prey on our neighbors’ hogs and cattle!”

Under a uniform law compelling every man to take care of his stock, and insuring him against harm from his neighbors, it is certain that the population of the Western States would have been some millions greater than now, while their wealth would have proportionately increased. Moreover, the farms would have been better cultivated, the houses better built, the barns larger and more comfortable, and the average stock of purer breed and higher quality. Let every legislature say to every settler, “Take care of your own stock, and we will see that your neighbor takes care of his,” and two farms will be opened along the frontier where one now is. The West seems to be perversely blind to its own interest in this matter; but it will not much longer be “the poor man’s asylum,” unless it shall open its eyes, and, by relieving him of the onerous “fence tax,” place the virgin soil within his reach.

Injustice of the Present System.—The proof of the bad economy and the bad policy of our present system of fencing, has suggested, also, its injustice. To compel A to fence against B’s cattle, is morally and socially wrong. It inverts the relation of things. It takes property from A without rendering to him an equivalent. Corn, wheat, oats, fruit trees, vegetables, stay at home quietly, trespassing on nobody, and interfering with nobody. Shall we put the onus of fencing on stationary or on locomotive property? Shall we burden with the cost of fencing the man whose property stays where it is put, and can not get away? or on the man whose property has legs, horns, and grinders, with a granivorous appetite?

The writer in the Illinois Report asks: “Is there any good reason why one man should be compelled to build from one to ten miles of fence to protect his crops from his neighbors’

stock, when such neighbors might do it with one-tenth the fence? Can any one give me a good reason why the law should be that a man shall stand guard over his one hundred and sixty acres of grain, rather than his neighbor over his one cow? Does, or does it not, seem right that every man shall take care of his own stock? On this hinges the whole question. *My idea is that every man shall take care of his own stock; and, as a corollary, that he shall be compelled to make only so much or so little fence as is necessary to do that thing."*

The Law of Fencing.—"Law," says BLACKSTONE, "is a rule of society, authorizing what is right and forbidding what is wrong." So we shall not expect to find the law, in the present case, commanding what has been shown to be flagrantly unjust. We are not disappointed. The common law does not require any man to fence against stock. Its spirit is to make every owner of stock responsible for all depredations that it shall commit.

Highway Fences.—The land occupied by a highway is still private property in most if not all of the States. If a public road is opened through a farm, the public acquires no right except to make and repair a road and travel the same. The owner reserves all rights not incompatible with the public right of way, and may maintain trespass for cutting timber, carrying off stone, or pasturing cattle on such road—for his land is assessed and taxed without any reference to the thoroughfare through it. He can also, in most of the States, maintain trespass and collect damages for animals entering his field from the highway, without being required to show that it is fenced at all. If a statute law were enacted authorizing A's cow to enter upon B's garden and devour his vegetables, unless she were kept off by B, it would be taking one man's property and transferring it to another—an act opposed to the fundamental principle of law.

There is no law requiring a fencing or authorizing a pasturage of the highway, except the law of custom, unless it be some "town vote," which, as it is not generally authorized by any statute law, and is directly opposed to the letter and spirit of the common law, is null and void. The law protects property; cattle and hogs upon the street are plunderers and pirates, and the owner is no better than his brutes. It is high time for the prominent farmers of every county to unite and co-operate, in compelling custom to conform to law.

Boundary Fences.—Most of the States have

enacted absurd laws requiring division or boundary fences between farms, and throwing half the expense on each of the adjoining proprietors—with the result that has been already seen. Some States have gone so far as to require highway fences also, and then to prescribe what shall be considered a "lawful fence." The usual "laws regulating enclosures" any sane man would have entitled "An Act to Authorize the Trespass of Cattle on Neighboring Proprietors, and to prevent any Indemnification therefor." By such a law, the whole State is declared a common, except such portions of its arable surface as has a line of fortifications around it.

Even if he faithfully complies, the farmer is not guaranteed against loss; for admitting that he can construct a fence, every yard of which he believes to be sufficiently strong to withstand high winds and storms, and to defy the most persevering assaults of breachy cattle, whose energies are quickened by famine—yet despite of his efforts, trespassing stock do make their way into his corn. What is his recourse? He brings a suit; obtains from a magistrate an order for the survey of his fence; the owner of the stock secretly makes gaps in it, and the owner of the corn is beaten, and adds the costs to the first damage! Our fence laws are laws to encourage pillage, and they ought to be repealed, or else be called by their right name. The great West, especially, ought not to delay action in a matter so vital to its own interests. As soon as the oppressive fence laws shall be abolished, there will be hundreds of thousands of poor men who will stake out their claims on the prairies and fearlessly put in their crops. The State that shall learn wisdom first, will receive the greatest accession to its population.

It is objected by some that highway fences are indispensable for the accommodation of drovers. Even if this were so, what justice is there in compelling the farmer to build them for the drovers' sole benefit? But they are not indispensable. Drovers have no great trouble in France or Germany. Experience has demonstrated that there is less danger of trespass by such stock where there are no highway fences than where they exist; and drovers know that they have less trouble in getting droves securely past farms where there are no highway fences than where there are such fences with an occasional gap.

The advantages of the proposed system are numerous and obvious. It would not only save millions of dollars every year to every State, but

it would improve immeasurably the character of stock and secure purity of breeds, by preventing contact with scrub bulls; it would enable every farmer to regulate the time of calving, thereby greatly increasing the number of animals raised; it would enable him to avoid the losses sustained by animals straying; it would give a delightful sense of security, saving to every farmer many anxious days and sleepless nights, and finally, it would do much to promote good neighborhood. Fences make more rustic quarrels than whisky does. The farmer would not need necessarily to fence his stock; he could herd it, soil it, or stake it out—any way to restrain it.

It is believed that great good would result if each State would pass a law providing that every man be responsible for all damages done by his cattle without regard to fences, and prohibiting any farm stock from running at large, under a penalty.

Some of the most enterprising farmers in New York, Wisconsin, and other States, have clubbed together in a number of towns adjoining, and entirely removed their highway fences, holding stock-owners responsible for all trespass. They have been sustained by the courts in every case where litigation has resulted. We trust they will persevere in their work of reform. The public apathy on this subject is incomprehensible. A tax not one-hundredth part as oppressive as this fence tax, nor half as inexcusable, lighted the flames of the Revolution, and separated the American colonies from Great Britain. But for the present, fences will be built, and we must tell how to build them.

Varieties of Fence.—There are five kinds of material used in this country for making fence, as follows:

1. Stone, in some States.
2. Earth, thrown from a ditch and raised into a regular embankment on one side.
3. Wood, of various construction.
4. Iron wire.
5. Hedges.

The location of the farm and its resources, will indicate the kind of fence most desirable to build. A good fence is always to be preferred to an imperfect one; it will generally save the extra cost, and twice the amount in vexation. Poor fences make breachy cattle.

Stone Walls.—Over large sections of New England, the stone wall is about the only fence seen. In those locations where surface stone abounds, especially if it appear in the form of boulders, or manageable fragments,

stone fences, broad and high, are the most durable, while they are at the same time the most economical. They should be set a foot below the surface of the ground to be secure against the action of frost, and then they should be well built. No other sort of fence is so valuable as a good stone wall, or so worthless as a poor one.

To begin with; the surface of the ground should be removed, and the foundation stones, broad enough to reach across the wall, should be laid on solid earth. If, as is generally the case, the wall is built of small, irregular stones, they should be bound together by large flat stones, or ties of some



WALL WELL LAID.

tough wood, laid across at intervals. The builder should be careful to break joints well—that is, to make one stone overlap another—as seen in the cut of the wall well laid. Where this precaution is not attended to, as is seen in the cut of the wall badly laid, in which long perpendicular seams appear, the weather will soon tumble the structure to the ground. It is common, where stone is not so plenty as to be an incumbrance, to lay up the wall some three feet, inclosing posts at convenient distances, and adding two rails to the top. Stone fences, in most of the States, are wholly impracticable from lack of material.



WALL BADLY LAID.

Ditches are not much relied on. In the first settlements, to secure the crops, the ditch-and-sod fence has been somewhat used in the deep prairie land; but the friable soil crumbled under the action of frost and rain, and the treading of cattle, and it proved an expensive and perishable structure.

Wooden Fences.—A great majority of the fences in this country are of wood. Of these, there are several kinds.

Zigzag Rail Fences.—The first fences built in America were doubtless zigzag rail or log fences; because these are the simplest, and, where wood and land are abundant, they are still the cheapest and best. This kind of fence costs in construction only, including the cutting, splitting, hauling, and laying it up, when the rails are within half a mile of the fence to be railed, at

the very least fifteen dollars per thousand; or, for a twelve-foot rail with a five-foot worm (and six is better), seven to eight rails high, with two rails for lock at each corner—thirty cents a rod. Then the young timber must be added to the cost, and this depends entirely upon its market value where the fence is located.

Season for Cutting Rails.—From August to October is the best time for cutting rails or any timber that is to be exposed to the weather.

"When Autumn comes, and leaves are dry,
And rustle on the ground,
And chilling winds go whistling by,
With moaning pensive sound,
Cut timber then for posts and beams and rails,
For tongues and thills, for whiffetrees and stales."

EDWARD TODD, in his *Young Farmer's Manual*, says: "Late Autumn is the best time for cutting timber for almost any purpose." Autumn hastens decay, and there is less in timber at that season than at any other. They ought to be split as soon as cut, and set up at once, or piled to season for the Winter. The *Cultivator* says: "The best time to cut and split rails is at midsummer, as we have learned by repeated experiment; the softer woods, as basswood for instance, lasting more than twice as long before decay sets in, as when cut in Winter or Spring. We have therefore preferred paying a higher price for the work in Summer than at other seasons."

MOORE'S *Rural New Yorker* says: "It is a pretty well established fact, that timber is more durable, cut in the Autumn or early part of Winter, than if taken from the stump in the Spring when every pore is full of sap." JOHN Y. SMITH, a good authority, differs from the *Cultivator*, for he says: "Cut your rail and building timber, your hop poles, and even your bean poles in the Winter. Nature has favored you by making the most convenient time the best time." We think Fall is the best time for almost any timber. If the reader is in doubt, let him experiment.

How to Make Rails.—Rails should be twelve feet long, unless the log be black ash, elm, butternut, pepperridge, or some other tough wood, compelling shorter cuts. It is quite a "knack" to split logs economically into rails, posts, etc. The wedges should always be first entered at the smaller end, and it is generally better to follow old checks, if there are any, than to split across them. If the log is very perverse, it is advisable to slab it, rather than to try to bring all the rails in triangles from the center. Rails should be peeled as soon as split, for if this is neglected, the bark becomes the nest of worms that greatly promote decay. Always remember to build

the zigzag fence *up hill*, instead of down; this will leave the rails more nearly level, and the fence will stand much firmer.

There are some obvious objections to zigzag fences in the older settled and sparsely-wooded States. They are offensive to the eye in a cultivated landscape. They require more wood than any other fence. They are obtrusive, occupying a strip of land twelve feet wide around every field—some two or three hundred thousand acres in the State of Pennsylvania. This is a severe tax—not less than two per cent. on all included land.

Straight Rail Fences.—A straight rail fence is cheaper than the zigzag, requiring a little more labor to construct it, but saving nearly half the rails. It is made with parallel stakes driven into the ground, as represented in the following cut, these being set just far enough apart to admit of laying the rails between them. Each pair of rails is laid on a block of wood or a stone, as shown in the figure, a larger stone being set for the foundation. The posts are fastened together with a pin, or with a band of wire at the top. This is the cheapest fence that can be made, and one of the most durable and efficient. It is neat and strong and requires little room.



STRAIGHT RAIL FENCE.

A straight fence is sometimes economically made by hewing the ends of the rail to a wedge and nailing them on the opposite sides of a single line of posts. This is less durable than the last mentioned.

Then there are the pole fence, the side-hill fence, the stake-and-rider fence, the post-and-bar fence, the leaning fence, supported by stakes, and other varieties, all of which are clumsy and inefficient, or else like the bar-post fence, too expensive for general adoption.

Board Fences and Posts.—Board fences cost from one dollar to five dollars a rod, and are used chiefly for the inclosures immediately adjoining the house. In selecting material for posts, it is a good rule to take the timber that you have the most of and can spare the best. Of course, other things being equal, the most durable should always be chosen; but other

things are *not* equal, for red and white cedar,* locust and white oak, sometimes bring a high price for other purposes, and can not be spared for posts. Chestnut is generally used in New England and the Middle States. When it is practicable, fence posts should be set in well-drained land, as they will last longer than on wet fields. For this reason good fence-builders no longer fill the post holes with stones—for these give free passage to water and hasten decay. It is better to pound the earth firmly around the post, adding only a few inches at a time and using an iron-shod rammer to harden it.

A great variety of "portable fences" have been patented, but they are generally quite too portable, being carried off by a good strong wind.

Posts for board fence should be set eight feet apart, and the boards should be sixteen feet long, four and a half or five inches wide, and an inch thick. Five boards high, with a cap or roof-board, are ample for a good fence.

How to set Posts Firmly.—Take equal quantities of waterlime and quicklime, and mix with sand as usual; put two or three inches of mortar and coarse gravel in the bottom of the hole, so that the end of the post will not come to the ground; then set the post in, top-end down; fill in several inches of coarse gravel; pound it down; then mortar and more gravel, and so on until the cement is raised above the ground several inches around the post. Slant it away from the post in every direction, so as to turn off the water; then take coal tar and a brush, paint around the bottom of the post, and fill the interstices between the post and the cement with coal tar. Only mix enough mortar for one hole at a time. The post will be as solid as if set in stone; it don't heave out with the frosts and sag around and pull the boards off, as the water and air can not get to it.

Charring the lower end of the post will add to its durability. Imbedding in ashes, charcoal, or lime will also have a good effect, and salt has great preservative power if it be concealed in an auger-hole and plugged in, so as to be out of the reach of hogs, sheep, etc.

Kyanizing posts consists in soaking them in some mineral solution, such as sulphate of iron, blue vitriol, creosote, etc., until the wood is saturated. The process keeps wood perfectly sound for a long time, and has been

found, in many instances, to pay the expense, especially for sills, bridge timbers, railroad sleepers, etc.

Experiments prove that the ends of posts and stakes dipped in hot coal tar and then covered with coarse sand, are rendered quite indestructible for a long time. Wood put in crude petroleum, and allowed to remain in it a few hours, is said to become exceedingly durable.

Gates versus Bars.—Every field on the farm should be entered by a good self-shutting and self-fastening gate. A proper inclination in hanging will secure the former requisite, and a good latch, properly constructed, the latter. Each field should be numbered, and the number painted on the gate-post. Let the farmer who has bars instead of gates, make a trial of their comparative convenience, by taking them out and replacing them without stopping, as often as he does in one year on his farm, say about six hundred times, and he can not fail to be satisfied which is cheapest for use.

Remedy for Sagging Farm Gates.—Have two latches, or rather one latch above and a stationary bar below projecting like a latch, which rests on a support cut in the arc or a portion of a circle, that is secured to the post in same manner as the catch of the latch. When the gate is swung to, the stationary bar on the gate strikes on the circular support on the post and raises the gate to its place, and supports it so that there is no bearing or strain on the latch or hinges.

Wire Fences.—It now seems quite possible that these may become the general substitute for other fences. A wire fence can be constructed for a dollar a rod, or less, and, considering its durability, it is now one of the most economical fences for those who have to buy their materials and pay for the labor. The price of wire, moreover, is decreasing year by year, and will probably become much farther reduced, whereas all other kinds of materials are becoming scarcer and higher, as settlement becomes denser.

Wire is especially effective on lawns as a defense for evergreens and hedges. Even small sizes will serve an excellent purpose.

The accompanying cut represents some of the different sizes of wire, the largest, No. 3 wire, being exactly one-fourth of an inch in diameter, and No. 11, one-eighth.



SIZES OF WIRE.

* A Maryland Journal says: "At the head of one of the graves in 'Old St. Mary's,' there stands a cedar slab, which, as the inscription indicates, was placed there in 1717, and is still perfectly sound."

Wire fences are as substantial as those of any other material; yet in hundreds of instances where they have seemed to be well built they have proved an entire failure, and the experimenters reported that such fences could not be relied upon for protecting cultivated fields from unruly cattle. SOLON ROBINSON says "the wire fence has not proved a success. If made cheap, it is not effectual; if made effectual, it is not economical." We believe that this opinion is not well founded.

Properly erected, they are at once economical and impassable. The first mistake is in making such barriers exclusively of wire. When three or four wires are strung up across a field, looking "like the shadow of nothing," as a farmer expresses it, with no top rail to notify stock of an obstruction there, young animals may plunge and dash against them, and something must give way. But if a good deep furrow be turned up against the posts on either side, and a stout rail be pinned along their tops, the line will be so thoroughly marked that no cattle, unless they be absolutely wild, will attempt its passage.

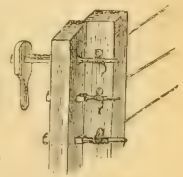
Wire purchased by the farmer is generally annealed ready for use; if it be not, let him build a bonfire, throw the coil on, and heat it to a red heat. This will make it tough and pliable. The size of wire to be used depends on circumstances. The price increases with the size. TODD advises against the use of No. 3 or 4 wire, and similar large sizes, for ordinary fences. "For fencing against small peaceable animals, like sheep," he says, "No. 12 or 13 wire is sufficiently strong; and No. 9 will turn horses and anything that wears horns. Any animal that will thrust into a fence, when it is properly made, with force enough to break a sound No. 11 wire, should not have liberty in an open field." Two sizes of wire may properly be used in a fence; the smaller at the bottom.

In fastening the wire to posts, either at the ends or intermediate, sharp corners should be avoided. At the terminus it may be put through the post and fastened; being attached to other posts by staples, or let into a notch and held there by a strip of wood nailed across. Or, the wires may be threaded through holes in every post. The posts may be made smaller than for a board fence; but none should be less than 3 by 4 inches at the lower end, and 2 by 3 at the top.

Some skill and ingenuity are essential to the construction of a good wire fence; yet the

method is simple enough when once understood. A single reach of wire should never be more than fifty rods—thirty is better. At one end of this should be the anchor post, where the beginning of the wires is fastened; at the other, two firmly set straining posts, twice as large as the intermediate ones. At the end of every reach of wire should be the permanent straining posts. Mechanical appliances are necessary to draw the wires to a uniform tension, after their ends are strung through two-inch holes in the straining post; these appliances consisting of a round two-inch stick of tough wood for each wire, turned in the holes of the second post, at right angles with the wire, with a wrench applied to its square end.

The wire is wound upon this stick as upon a small reel, as shown in the accompanying cut, strained by means of the wrench, and when perfectly taut, the stick is driven into the square hole in the side post, and thus the wire



STRAINING POSTS.

kept permanently stretched. The illustration represents the lower wires stretched, and the upper wire undergoing the process. The side post may be dispensed with, if square staples are driven firmly into the main post to hold the straining stick.

In warm weather the wires expand with heat, and they should then be drawn tight; but they should be loosened a little in the Fall to allow for the contraction in Winter. The wires may be fastened at every post by driving the staples tight or plugging the holes; but it is generally considered better to fasten at every eighth or tenth post. To prevent animals from putting their heads through between the wires, they are sometimes stayed with small well-annealed wire, bound up and down midway between the posts.

A tree at each end of the reach of wire is much better than posts; it is very difficult to make posts sufficiently firm. In applying the wire to the fence, unroll it by trundling the coil along, this will prevent kinks. Wire fences of this kind can be made for twenty-five cents to one dollar a rod. Hon. H. F. FRENCH made seventy rods, which proved effective, between his corn and pasture fields, of No. 9 wire, at twenty-three cents a rod.

Hedges.—Among the most picturesque, durable, and economical fences, are hedges made of living plants, usually of thorny varieties, disposed to grow in a close and impervious manner. Hedges form one of the most striking features of the European landscape, frequently dividing the estates from each other. In the moist English atmosphere they attain a deep green, which they never exhibit in this country, and the hawthorn and buckthorn become remarkably tough and sturdy.

It is asserted and widely believed that hedges have proved a total failure in this country; but, while it is known that there are thousands of miles of hedges that will effectually turn every kind of farm stock, the fact will be considered worth at least as much as the theory. There are thousands of farmers who are certain that hedges make the very cheapest and most durable fence in those sections where stone and wood are scarce. The causes of the numerous failures generally lie either in the choice of a hedge-plant not adapted to the latitude, or in an improper treatment at the time of transplanting, or insufficient care afterward, neglect to cultivate, timidity in pruning, impatience to wait four years, and scarcity of labor.

The English thorns generally fail as hedges in this country. Evergreen hedges of arbutus, red cedar, or Norway spruce, are best adapted for shade and ornament here, but they are not so well calculated to resist stock as the deciduous thorn bushes, the Osage orange, honey locust, thorn locust, barberry, privet, etc.

The Osage Orange, or Maclura.—The Osage orange is the hedge plant of the United States. It has often failed; but the failure has usually been the fault of the hedger, not the plant. With proper culture, it will, in three or four years, grow a hedge so compact that no stock will pass it. WILLIAM NEFF, of Cincinnati, Ohio, one of the pioneers of hedging, affirms that "if rightly managed, it makes the best and cheapest fence in the world, without any special objection whatever." In the beauty of its foliage and fruit, its habit of spreading near the ground, the quickness of its growth, the stubbornness, elasticity, and density of its branches, the sharpness of its thorns, and immunity from insect attack, it is unrivaled. It is tolerably hardy, but winter-kills in the latitude of upper Wisconsin and Minnesota.

The Iowa Homestead, of a recent date, says: "A million Osage orange plants were sold and delivered in Madison county last fall. There are upwards of two hundred miles of Osage-

orange hedge set out in that county alone, during the last three years, and there is a good prospect of seeing a hundred miles more set out this Spring." In Iowa, Illinois, Indiana, and Ohio, there are five times as many miles of Osage orange hedge as of all other sorts put together. Fifteen Osage orange plants, costing thirty cents, will make a rod. C. W. MARSH states in the *Prairie Farmer* that, sixteen years ago, he set out two thousand plants, making eighty rods of fence. A proof of the good manner in which the work was done is furnished by the fact that all are growing to-day except two. He says he has exercised the same care that he should give in raising a good crop of corn. In five years an efficient hedge was formed, and it is now eleven years since the line was turned out as a fence, and no horse or horned animal has ever been through it in that time. One end has been used for the last three years as a fence for hog pasture, since which time no hogs or pigs have ever been through it. The cost has not been twenty-five cents per rod.

The Honey Locust (Three-thorned Acacia).—The honey locust is indigenous to this country, and is hardy, being somewhat introduced for hedges north of the line where the Osage thrives. It is common in the Western forests, and attains the height and size of a tree if left to its own habit. It is armed with long ugly thorns, and when properly dwarfed and compacted by vigorous pruning is impervious to stock. As Dr. WARDER says: "Vineyards and orchards enclosed with the three-thorned acacia would need little guarding against depredators." It grows very rapidly and strongly, survives the most relentless trimming, and tends to stout laterals, armed with menacing spikes. Timidity in pruning has been the chief cause of failure with the locust hedge—as, indeed, with all others. But it is doubtful if any plant, whose natural growth is from twenty to fifty feet high, can be kept down within the bounds of an ordinary hedge, and retain a healthy state.

The Barberry.—This is a natural dwarf, and is one of the very hardest of wild shrubs, adapted to the extremities of our northwestern climate. It is highly ornamental, and bears crimson berries that make a grateful acid jelly, grows freely, is easily propagated from seed, does not sucker from the root, is sufficiently thorny, cattle will not eat it much, and mice and insects not at all. It is recommended for hedges by the Wisconsin Horticultural Society,

and is being tried in that State. It will not grow so compactly as the Osage hedge, but will probably make a good substitute in the higher latitudes where that fails. The *Wisconsin Farmer* says: "The several examples of barberry about Lancaster, from five years old up to fourteen, are, so far as we know, the best in the Northwest, as indicating what it will amount to for usefulness. The lots, fourteen years old, are about ten feet high, and would defy all the stock in the country, and we can hardly see how a regiment of infantry armed with bayoneted muskets could break through. The lots five to seven years old, about seven feet high, are hardly so impenetrable as the elder, but would certainly turn any kind of stock. Perhaps the best method of starting a barberry hedge would be, to plant the young stools three feet apart and fill up by layering between."

The *Oneida Circular* says: "We have a barberry-hedge on our grounds at Wallingford, Connecticut, twenty-five rods long, and nine years old from the seed. This hedge has been clipped a little two or three times, to keep it even, and is now six to ten feet high, with a firm, compact base, perfectly impervious to the smaller animals, and stout enough to turn cattle." The canes of each stand ultimately number seventy to one hundred, thrown from a single center, just as the twenty to thirty rye straws proceed from a single grain. These canes rise in a curve at first, then assume a perpendicular, the top of the common stand rising each year, till a height of eight to ten feet is attained, after which there appears no further increase of the height.

P. ALLYN, of Benton Harbor, Michigan, writes: "One fact is worth half a dozen guesses. Four years ago I planted ten rods of small barberry plants for a hedge on my place. That hedge now appears much like a perfect fence. Man or beast would try more than once before passing through it. Two years more of such growth as it had last year would make it hog-tight, horse-high, and bull-strong. I do fully believe that the barberry is yet destined to become the great hedge plant of America."

The new *American Encyclopedia*, in speaking of the barberry, says "it lives for centuries." This is probably the hardest plant now used in America for hedges.

The notion that the barberry communicates fungus or other diseases to wheat, which has prejudiced many farmers against it in the West, is a foolish fiction, without a shadow of founda-

tion in fact. It is one of the healthiest and toughest of plants. The fungus that sometimes grows on it, is not communicable.

Other Kinds of Hedge.—The English hawthorn is said to make good hedges in Canada; but being a native of a more humid clime than ours, it usually sheds its foliage in our dry Summers, making it much less attractive and protective. The cockspar has been used to some extent; not enough to test its general adaptation to our needs. There are certain black thorns, native to the Western States, that make a good hedge when properly trimmed and cared for. The buckthorn succeeds well, and is considerably used; it bears close pruning, and is possessed of remarkable vitality.

Taking all things into account, the American arborvitæ is the best evergreen hedge plant. No matter how old it is, it has always a tendency to keep furnished with foliage to the ground, which is essential to a good hedge plant; and as it grows slow, and conically, it can be kept in trim with little care or cost. The Norway spruce makes an admirable protective evergreen hedge, if allowed to have about four feet of a base, and trained to a truncate form, as indeed, all evergreen hedges should be.

The Cherokee rose has been extensively grown for hedges in Georgia, Alabama, Mississippi, and Louisiana, thriving as far north as Memphis. M. W. PHILLIPS, the veteran editor of the *Southern Farmer*, says: "The Cherokee rose is a pure white fragrant flower, single, with bright yellow center, and the foliage is a rich bright green."

It is an easy matter to get a fencing of this rose started. Take the runners, cut them in pieces about a foot long, lay these in a furrow, with one end protruding, and tread the earth down. They will be almost certain to grow. In four years you will have an impenetrable fence, which fire only will be able to destroy.

Says Mr. PHILLIPS: "My plan is—I throw up a ridge with four or six furrows of the turning plow, having laid off a row to bed to; I then harrow down fine with an iron-tooth harrow; I then stretch a line, make holes slanting under the line with a dibble, and then insert the cuttings some six inches deep, and press the earth firmly on them. My plants are put in about one foot apart." Out of a mile of hedging set out, nine out of ten cuttings lived. The great difficulty with this rose for hedging is to keep it in due bounds.

Cultivation of Hedges.—In planting for the

Osage orange, great care should be taken to select good seed. The best method of sprouting the seed is as follows: Soak them in warm water from thirty to forty hours; then put them into shallow boxes not more than four or five inches deep; to every quart of seed add a pint of sand, then mix thoroughly, keep in a warm place, and wet it as often as twice a day with tepid water. Seeds attended to as above, would sprout sufficiently in eight days to sow in the ground. If it is preferred, however, plants can be purchased at very reasonable rates.

Much care should be taken in the selection of the ground for the seed. It should be fertile, and as free as possible from the seeds of grass and weeds. It should be mellow and incline to moisture, but not subject to bake.

In removing the plants—in Spring or Fall—a subsoil plow should be used, the share of which should be steel, quite large, and as flat as possible. The plants should be cut off eight or ten inches below the surface of the ground.

Preparatory to setting a hedge, the ground should be thoroughly broken up to the depth of twelve to fourteen inches, the "lands" being at least eight feet wide. By setting the plants in the center of the "lands," there would be left spaces four feet wide on each side to cultivate. After the ground has been fully prepared, the row should be staked off and a line stretched along its length to work by. The holes for inserting the plants may be made with a stake about two feet long, rounded and sharpened at the end. These holes should be about nine inches apart for the smaller plants, into which the quicks should be inserted about an inch deeper than they grew in the nursery. This being done, the earth should be well packed around the roots. Next comes the operation of cultivating, hoeing, plowing, etc. The spaces on both sides of the hedge require thorough cultivation, and the ground kept clear of grass and weeds during the season.

No plants should ever be set in a hedge nearer than nine inches apart, while the red cedar should be twenty inches, and the honey locust three feet. Overcrowding has spoiled many hedges. It is better to set the Osage orange in two parallel rows, a foot apart, and the plants eighteen inches apart in each row, having a quincunx arrangement, thus:



SUEL FOSTER, of Iowa, remarking that shading is absolutely necessary for the young plants, says that at DOUGLASS' nursery, at

Waukegan, three modes are adopted: 1. Strips of building lath are nailed on two narrow strips of boards, so as to make screens four feet square, which are easily handled—the spaces between the lath admitting only one-half or one-third of the sun's rays. 2. Cross boards are nailed horizontally, seven feet high, on tall posts, and brush worked in below the cross boards. 3. Brush is stuck up at the south side of the beds.

Mulching is also resorted to successfully in the West; even the most careless hedger should throw down some refuse straw on the north side of his young hedge to catch the snow.

A hedge, to be of any practical use, must be thick at the bottom, and therefore should be closely cut back while young, and often pruned, in order to force out lateral shoots near the ground. Conical forms are now generally sought for hedges.

The next Spring after transplanting the plants must be cut off near the ground, below all the buds, just above the top of the roots. The roots then swell and put out a number of strong shoots. The hedge needs cultivation until the middle of June, when it should have another trimming, within two inches of the first. The second Spring it should be trimmed eight inches above former cutting, and in June eight inches higher. After this it needs but trimming once a year.

"In March, before your hedge is three years old, plash it, *i. e.* cut half off close to the ground every first and second plant, leaving each third one standing, trimming the limbs off of the third, leaving it like a stake, then take the top of the plants that are cut half off and bend them lengthwise with the hedge, weaving them together on alternate sides of the uprights, after the manner of basket-making. By this method you can have a fence that will turn any kind of stock at four years from planting, by taking proper care of it." Dr. WARDER thinks "plashing is a barbarous process, to be practiced only under a pressing necessity."

It is strongly recommended by some experienced hedgers to apply the shears to the young hedge during the year of planting, but Dr. WARDER deprecates this, and thinks that "great risk will be run of injuring the strength of the plant, by commencing the decapitation too soon."

We ought here to say that the *first* and most imperative step for any man to take who is about hedging his lands, is to procure the admirable work on Hedges and Evergreens, by

Dr. JOHN A. WARDER, of Cincinnati, editor of the *Western Horticultural Review*. To that complete treatise our readers are indebted for some of the best suggestions of this article.

We copy from *Rural Affairs* the accompanying illustrations of the growth of a hedge plant, and methods of pruning it from the time of transplanting until it arrives at the perfection of a complete hedge.



FIRST-YEAR—
TRANSPLANT-
ED QUICK.

The dotted lines which we have indicated across the immature plants show where the clipping



SPRING AFTER
SETTING.



JUNE OF SECOND YEAR.

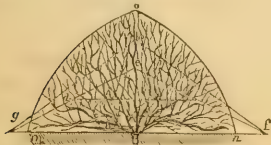


SPRING OF THIRD YEAR.

should be done at the different stages of growth. The angle gef , in the cut of "Spring of Fourth Year," and the angle ghf , in the cut of "End of Fourth Year," also repre-



SPRING OF FOURTH YEAR.



END OF FOURTH YEAR—COMPLETE HEDGE.

sent the lines of trimming as the plant approaches maturity, while the final trimming brings it to the desired form of the Gothic arch. The pruning, as indicated, must be relentless, or the result will be an unshapely hedge. The lines of pruning are all repeated

in the cut "End of Fourth Year." This method of pruning, which is also recommended by Dr. WARDER, does not contemplate the operation of "plashing," which is not adapted to all hedges.

During this year, or the next at latest, the protective fence may be removed, and the fence may be turned out to cattle and all farm stock.

Even after this time the hedge must receive attention and an occasional day's work. If a point gets weak, it must be protected by a fence while new quicks are set, or the old plants shorn off at the ground and trained anew to fill the gap.

The operation of "plashing," or lopping a hedge, already described, may be practiced with excellent effect in the renovation and reconstruction of a hedge whose proper pruning has been neglected—and of these there are hundreds of miles in the West. There are, in every State, hedges six to ten feet high that have practically had their own way, and now long rows of trees, a barrier against cattle, but no obstruction to the smaller farm stock. These ought immediately to be plashed—very early in Spring—by cutting the plants half off and bending them down with a pitchfork, lengthwise of the hedge to an angle of 45° , or even lower. New shoots will soon grow from the stock and push up through the old tops, forming an impenetrable hedge that should be rigidly pruned according to the method already given.

Cost of Hedging.—Professor J. B. TURNER, of Jacksonville, Illinois, has his farm of a hundred and fifty acres surrounded and subdivided with four miles of hedges of the Osage orange, and he declares he will never allow another board or rail to be brought on his land for fences. He estimates that ordinary rail fences would cost \$300 a mile, while hedge would not cost "more than \$25 a mile." This would give a clear saving of \$1,000—whose annual interest will hire a man to attend to the hedges. To add to the comparative value, the fences would all the while grow poorer, while the hedges constantly grow better. E. MILLER, of Waverly, Illinois, says that "a good fence can be grown on good ground at fifty cents per rod," and HENRY SHAW, of Tazewell, says: "Had I time, I would agree to fence the whole Mississippi Valley for twenty-five cents a rod for one kind, and fifty cents a rod for the other kind of hedge—to perfect them in three or four years." It will pay for an unskillful farmer to employ a professional hedger.

THE WORKSHOP:

TOOLS AND IMPLEMENTS—WHAT KINDS TO GET, AND HOW TO USE THEM.

The Home Workshop.—Every owner of a house, who has much use for tools, should have a workshop or room where they may be stored and repaired, and where in leisure hours he can, if he be ingenious, mend tools, renovate broken pieces of household furniture, and even construct rustic chairs and lounges for the lawn, or footstools, ottomans, camp-chairs, picture-frames, and other articles of household use and adornment.

As an Educator.—If he have children, whether boys or girls, he should include in their education some instruction in the handy use of carpenter's tools, for such knowledge will be of real service during their lives; and the best legacy any man can leave to his children is *to show them how to help themselves*. Then, if they are not well served, it will be their own fault. *Rural Affairs* thus concludes: "A young man, whose natural ingenuity is so developed by practice that he can at any moment repair a rake, adjust a scythe, fit in a new hoe-handle, set a clock in running order, sew a broken harness, make a door-latch fasten easily, set a gate in good swinging condition, sharpen a penknife, give edge to a pair of scissors, mend an umbrella, repair a cistern pump, whitewash a ceiling, paper a room, stop a leaky roof, make a beehive, bottom a chair, and cobble and black his own boots, will pass through the world more comfortably to himself, and profitably to those around him, and be far more worthy of the hand of the finest young woman in the country, than the idle and sluggish pretended gentleman, with pockets full of cash earned by his father, and who is obliged to send for a mechanic for all these services, which he is too helpless to perform himself."

As a Convenience.—Every farmer worthy of the name, will say "amen" to the last paragraph; and if the son follows his father's footsteps, with such a workshop as we suggest always accessible, he ought soon to be able also

to set an ax-helve, make a saw-horse, construct a harrow, strengthen a plow with a new beam or handle, hew out bar-posts, supply an ox-yoke with bows, hoop or head a barrel, and do a hundred other things that demand immediate attention on every farm, and that rainy days furnish the opportunity for doing.

Garden Tools.—Every dweller in city or village, who has a garden, especially if he also have something of an orchard attached, should provide himself with a decent set of horticultural implements of approved kinds. One great reason why gardens are so wretchedly cultivated, why weeds are permitted to outgrow and smother valuable plants, why fruit trees become barren and decay, is the want of a good set of horticultural implements with which to guard against these evils.

How frequently does the gardener in a leisure hour observe the wants of a favorite tree, that it needs pruning, that his hedge needs trimming, that a favorite fruit should be budded, or a hundred other things which should be attended to but are not, because the suitable tools are not within reach.

The work of the garden may be greatly lightened and facilitated by the use of tools of the best materials and construction. A spade, with a sharp edge, or better still, a spading fork with stiff steel tines, is all-important in the early processes of the garden. A pointed shovel with a long handle, saves a good deal of back work in transplanting shrubs and fruit trees. A sharp steel hoe, with a light, smooth handle, or what is better for many kinds of work, a prong-hoe, such as is often used for harvesting potatoes, is indispensable all through the season. The former is preferable for cutting off the stems of large weeds and hoeing corn and potatoes, the latter for covering the same at planting, as it loosens the soil to a considerable depth with ease and rapidity, and is not liable to clog in moist ground.

For weeding, where the ground is not too rocky or uneven, a scuffle-hoe is advisable. It goes by pushing, instead of drawing, as the common hoe. There are several new varieties of this kind of hoe.

Another implement, always in requisition in garden work, is a steel-tooth rake. The teeth should be pretty close together, and not of great length, as they are liable to break. Such a rake may be used, not only for raking off seed beds, and clearing them of weeds and stones, but also for destroying small weeds when they are just peeping above the surface. It will be found as well adapted for this purpose as is the brush harrow in field cultivation.

Hoes and spades should be kept sharp. They may be ground on the grindstone, or sharpened by a rasp or file. The latter may be carried with you in the garden, and used as occasion requires, just as the rifle to whet a scythe. Thus treated, they may not last as long as if never sharpened, but if one will make the trial of a dull hoe and of a sharp hoe, he will be surprised at the difference. No wonder it has passed into a proverb, "As dull as a hoe," when the operator never had wit enough to give an edge to it on a grindstone. The short time and slight expense required for sharpening a hoe, not less than a scythe, if it enables one to do more and better work with the same expenditure of strength, are not to be named in comparison with the benefit.

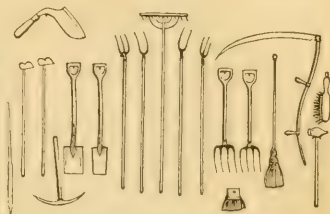
Construction and Outfit of Workshop.

To a farmer, such a workshop as we have suggested is well-nigh indispensable. It may be a building erected on purpose, or partitioned off from the carriage-house, the corn-house, wood-house, or barn. Let it be neatly made, and not unpleasantly situated, for it should be attractive and not repulsive to those for whom it is intended. It should be tight and light, and furnished with a small stove, so as to be comfortable in Winter. It should not be less than fifteen feet square—twenty is better.

Along one end should be hung, on pins suitably adjusted, the farmer's smaller tools—his hammers, hatchets, buck-saw, grafting tools, trowel, axes, etc., each one in its place, where the hand may always be laid on it in a moment.

Along one side of the room should the coarser tools of the farm be similarly arranged. Nearly every tool can be hung on a spike or a pin, or between two. If hung perpendicularly, they will be most accessible, and will occupy the least room. The following cut shows how these

tools will look when thus neatly and compactly stored. In order that each implement may always be in its place, the plan devised by TOWNSEND SHARPLESS, of Philadelphia, is



INTERIOR OF TOOL ROOM—LARGE TOOLS.

the best. Hang each tool in its position; then draw its outline accurately on the board-wall with pencil or chalk; then, with a brush dipped in some dark-colored paint, make a distinct representation of the shape of the tool. These outlines will not only show where the tool should be put, but show at a moment if any has been left out of place. The consciousness that there is such a tell-tale in the tool room, will stimulate any careless laborer to return every thing which he takes out.

Every man ought to be willing to lend a tool to a neighbor, in a pinch (excepting his tooth-brush and razor), but the borrower should be given to understand that its prompt return is expected. If he fail to bring it back, the owner should go for it the moment it is due, and express his unwillingness to have it out of place. If this is done with decision and kindness, it will probably insure punctuality next time.

With such a room, properly kept in order, the farmer will be saved hours of searching, many weary steps, and much vexation every year; and, besides this personal wear-and-tear, he will save greatly in the increased durability of his tools.

On the opposite side of this room, under the window, should be the principal feature of the shop:

The Work-Bench.—This should be ten to twelve feet long, two feet and a half or three feet wide, and about two feet nine or ten inches high—this last depending on the average height of the persons who are to use it. Any farmer can make one if he knows how to use a saw, plane, and chisel. The top should be made of three-inch plank of some hard wood; and the frame of timbers morticed solidly together and

braced. The vice should consist of two jaws of hard timber, four by five inches square, having a hinge near the floor, and extending six inches higher than the bench, the tops being protected with iron caps. The bench should also be furnished with a small iron dog, or plane-hook, movable, to catch the end of a board and hold it while it is being dressed on its side, and also a rest to hold it firmly on its edge.

Back of the bench, on wooden pins, should be hung three different-sized planes, a saw-set, graduated augers, and hand-saws, a drawing-knife, a mallet, a wrench, a square and a tri-square, and a brace, below which there should be a tool rack, for holding a variety of chisels, bits, files, gimlets, scratch-awl, etc. Every chisel, file, and bit should have its place; so should the screw-driver, and the places never should be changed. There should be drawers under the work-bench, or against the wall at its end, or a large box with a bow-handle, subdivided for nails and screws of various sizes, nuts, bolts, rivets, brads, tacks, etc. Here should be found whitewash, paints, oils, and brushes; cement, pruning, and grafting tools; syringes for irrigating plants; glass, glue, nails, screws, putty, glazing tools, whetstones, and, indeed, every article that may be required in keeping the premises and apparatus of the farm in a state of complete repair.

A part of these tools will be sufficient to begin with; indeed, the bench can be decently fitted up for from ten to twenty-five dollars, and other things can be added, when convenient, from time to time. If the farmer have many hoop-poles to make, a shaving-horse for using the drawing-knife will be requisite. It will also be desirable to have an anvil; if he can not purchase an old one, any heavy piece of iron will answer.

Value of a Workshop.—It is always perplexing and unpleasant, and not unfrequently a cause of much expense, to be compelled to run to the carpenter or blacksmith every time a hinge is replaced, a wheelbarrow injured, or a strap broken. A little skill in the use of tools—and this any person of moderate capacity can readily acquire—will enable one to save many dollars annually, besides furnishing pleasurable and profitable employment for many an otherwise idle, and, perhaps, painful hour.

One of the component parts of a good farmer is mechanical ingenuity. Some lose half a day's valuable time, for want of knowing how to repair a breakage which an ingenious person

could do in five minutes. A team and two or three men are sometimes stopped a whole day, at a critical season, for want of a little mechanical skill and a few tools.

After a brief experience at the bench, an enterprising farmer will repair some of his implements better than a mechanic would. But he must learn not to be satisfied with botch-work. Better never have a work-bench, even if it were given to him, than to use it, as some farmers do, in patching their implements clumsily.

Get the Best Implements.—Every farmer should not only aim to provide a complete set of farming implements, but that set should be of the most approved construction and the best quality. It is wretched economy to place awkward, unwieldy tools in the hands of laborers, when light, convenient, and equally durable ones may be had for the same price. Even if the best cost a third more, they are almost always cheapest, for they not only spare the backs of the workmen, but secure a greater amount of work. With what care should the farmer select his plows! How earnestly endeavor to procure those of the lightest draught and easiest management! The comfort of his horses demands this, and the extra amount of time and money expended in the selection will be more than repaid by the better condition of his horses or oxen, and the superior manner in which the work is done. No sign denotes a good farmer more certainly than the pattern and condition of his implements. Especially is there an infallible test of his thrift in his

Care of Tools.—Every teamster who is fit for his business, when he puts up his team after a day's drive, will take care not only to see that they have a suitable supply of feed and water, but will rub them down, clean and dry, and make them *externally* comfortable, because he knows it to be essential to their health, vigor, and continued usefulness. The engineer, when he stops his engine, will pursue much the same course with the iron muscles of his machine. He will rub them dry and bright, and forestall the mischievous tricks of old oxygen by oiling every part exposed to air or water. The carpenter does the same with the implements of his art, and the mason never lays down his trowel for a single hour without first wiping it dry and putting it in a dry place, or thrusting it in and out of the mortar, and thus giving it the defense of the lime.

Of all the implements of human effort, none are so commonly and so sadly neglected as

those of the farmer, while none need more vigilant care in order to secure their durability and efficiency. Very commonly the hoe is left with the blade covered with damp earth and resting on the ground for days and perhaps weeks together, and the same with the spade and shovel. The plow is left at the end of the last furrow in the field, half beam deep in the ground, or thrown out beside the fence, or left out in the barn-yard, until it is next wanted. Seythes and pitchforks, and even reapers and mowers, drills and cultivators, wagons and carts, too often fare similarly, and their metallic portions are left to oxydize, and the wood parts to crack in the sun and rot by the moisture to which they are exposed, and when next wanted, are in wretched condition for use. We have seen an expensive reaper standing two feet deep in snow in midwinter. It was safe to infer that the owner's farm was mortgaged, or else that he worked unnecessarily hard to keep out of debt.

Let any one take a hoe or a spade, for instance, that is black and rust-eaten, and work with it for an hour, and then try one that has been kept bright and clean, and he will see the difference. When an implement of this kind has once become rusted over, it may be partially recovered by scouring in use at a great expense of extra labor, but it will never be what it once was. A saw or a trowel, when once badly rusted, is as good as ruined. You may scour it as long as you will, it will never again work smoothly and easily as one will that has been kept bright and free from rust. It is just so with any polished metallic surface used in farming. It is eaten full of little cavities which will secrete dirt and moisture, and keep up a corrosion which defies all efforts at arresting or rubbing it out, and it is a heavy, dragging tool forever afterward; no matter whether the surface be that of a hoe, a spade, a plowshare or a journal and box, it will ever be a drag on man or beast. Everything of this kind should be cleaned and wiped dry every night when in use, and not left exposed even to the dew of a single night without being first rubbed over with fresh grease, and when done with for a time, should be oiled and stored in a dry place.

Especially is it unpardonable to leave the more expensive kinds of machinery exposed to the weather. They are liable enough to injury by unavoidable exposure in use, but when they are left to stand out for months, exposed to sunshine and rain, it is a reckless waste of money.

The wood and unpolished iron work of all valuable machinery on the farm should frequently receive a fresh coat of paint, as from the nature of the service it is liable soon to wear off, and an occasional coat of yellow ochre—which is cheap and durable, and will not cause the wood to warp—will save its small cost many times over. Whenever a machine is laid by for the season, every journal and box should be carefully cleaned and supplied with fresh oil. An occasional coat of linseed oil upon hoe, fork, spade, and shovel handles will have nearly the same preservative effect as paint, and add much to their agreeableness to the hand.

Linseed oil is not used freely enough by farmers or even by mechanics. Every farmer should have a can of oil and a brush at hand, and whenever he buys a new tool should saturate its wooden parts well with the oil, and dry it in by the fire, or in the sun, before using. By this treatment the wood is toughened and strengthened, and rendered impervious to water. Wet a new hay-rake and dry it, and it will begin to be loose in the joints. If we oil it the wet will have slight effect. Shovels and forks are preserved from creaking and cracking in the top of the handle by oiling. The wood becomes smooth and glossy by use, and is far less liable to blister the hand when long used. Ax and hammer handles often break off where the wood enters the iron. This part particularly should be toughened with oil, to secure durability. Oiling the wood in the eye of the ax will prevent its swelling and shrinking, and sometimes getting loose. The tools on an extensive farm cost a large sum of money. They should be of the most approved kinds. It is poor economy, in times of high prices of labor, to set a man at work with old-fashioned implements. Laborers should be required to return their tools to the convenient place provided for them, after using. They should be put away clean and bright. The mold-boards of plows are apt to get rusty from one season to another, even if sheltered. They should be brushed over with a few drops of oil when put away, and they will then remain in good order till they are wanted.

Preservation of Wood.—The following application is used in Germany for the preservation of wood: Mix forty parts of chalk, forty of resin, four of linseed oil, melting them together in an iron pot; then add one part of native oxide of copper, and afterward, with care, one part sulphuric acid. The mixture, while hot, is applied to the wood by means of

a brush; when dry, it forms a varnish hard as stone.

The following is recommended for dry-rot in timber, so as to make it indestructible by water: Melt twelve ounces of resin in an iron pot; add three gallons of train oil, and three or four rolls of brimstone; when the brimstone and resin are melted and become thin, add as much Spanish brown, or red and yellow ochre, or any other color required, first ground fine with some oil, as will give the whole a shade of the depth preferred; then lay it on with a brush as hot and thin as possible; some time after the first coat is dried, give it a second. This preparation will preserve planks for ages, and keep the weather from driving through brick work.

Polishing Plows.—Elbow grease, liberally applied, ought to keep a plow from rusting much; but on coming from the field every plow should be touched up with some sort of fresh grease. A mixture of three parts lard and one part resin, melted together, forms one of the best coatings for all steel or iron implements. The lard makes the resin soft, while the latter is a sure preventive against rusting.

But sometimes, in the hands of a careless or a lazy man, a plow will get rusty; then it should be cleaned immediately.

The *Farm Journal* suggests that if those who wish to spare themselves the trouble of polishing a rusty mold-board, will have recourse to muriatic acid—quite a cheap article—they will find that the acid will not touch the iron, but will render the rust soluble and easily removed. No farmer should allow the surface to remain moist with any acid for twenty-four hours. Muriatic acid will do the work in five minutes, and should be either washed off, or cleansed by running through the soil, without delay.

Nails, cut or wrought, may be rendered almost imperishable, by heating them nearly red-hot in a fire-shovel, and then dropping them into a glazed vessel containing train oil. They absorb enough oil to enable them permanently to resist rust. Or cut nails may be properly annealed by heating red-hot, and cooling gradually in the fire while it burns down and goes out. One such nail, well clinched, will be worth, for mending implements, half a dozen unannealed.

To Saw Iron: Heat it to a white heat, put it in a vice, and it will saw off like wood.

Using of a Wrench.—"Those who would keep their buggies and carriages, or even their field

machines, in good order, should place a wrench on every nut at least once a month. This will save nuts, save bolts, and prevent rattling, and wear and tear.

We have sometimes known nuts on threshing machines, circular saws, etc., to be found so tight that no wrench would remove them. This was because they had been held in the hand, or the pocket, till they became warm, and being then applied to very cold screws in Winter they contracted by cooling after on, and thus held the screw with an immovable grasp. Always avoid putting a warm nut on a cold screw; and, to remove it, apply a large heated iron in contact with the nut, so as to heat and expand it, and it will loosen at once—or a cloth wet with boiling water will accomplish the same purpose.

If you have a screw rusted into wood, or a nut on a bolt that will not readily turn, pour on it a little kerosene and let it remain. In a little while the oil will penetrate the interstices so that the screw or nut can be easily started. A nut that will not yield to the leverage of the wrench, may sometimes be started by a sudden blow with a hammer against one corner, while an ax-head is pressed against the corresponding side of the corner diagonally opposite.

Care of Harness.—The *Rural World* says: "How little care is bestowed upon harness! How it is thrown about anywhere and everywhere! It is not oiled or washed from one year's end to another. Consequently, the leather soon becomes rotten, and the harness worthless. Harness is now very high, and it behooves farmers to take the best of care of it. It needs but little oiling or greasing—one or two applications a year being enough. But every two or three weeks it should be washed with strong castile soap-suds. There is enough oil in the soap to keep the harness in good condition. If oil is applied—neat's-foot oil is considered the best—it should be used after washing the harness with the castile soap, say a couple of hours afterward. Have a nice snug place in which to hang your harness; and always put it in its place, so that you can put your hand on it at night as well as by day." The *Prairie Farmer* says: "After oiling, fill a sponge with the white of eggs, and again rub the entire harness; this will impart a gloss scarcely attainable in any other way without injury to the leather."

Be sure and cover the bits of your bridles with leather, to prevent the frost from making the mouths of your horses sore. It is down-

right cruelty to put an iron bit into a horse's mouth on a cold morning. If you doubt it, bit yourself some cold day when the mercury stands below zero.

Sharpening Edge Tools.—More than one-half of all the wear and tear, and breakage and bother of dull tools comes from a lack of proper knowledge and practice in grinding. Good tools are the offspring of a good grindstone and skill in using it; a poor grindstone is an almost infallible symbol of a bad farmer.

The grindstone should neither be too hard nor too soft—upon its proper grit depend its efficiency and durability. It should be firmly hung on a long shaft, with the crank at least two feet from the stone, so as not to interfere with the operation of grinding an ax, scythe, or knife of a cutter. It should run perfectly true. If the shaft be not precisely in its center, or be not exactly at right angles to the plane of the stone, it will be impossible to grind properly or easily upon it. After being accurately hung, the stone should be sheltered, for the weather will greatly affect its quality.

Turning the Stone.—When your grindstone is of a perfectly straight face across the stone, take a little good tar, and make a ring around the stone in the center, and it will cause it to ridge up in the middle, so as to be more convenient for grinding a perfect edge on a tool. You need not tell your careless neighbor to please to grind on the edge of the stone, for he *can not* grind in the center—the tar will prevent him from gouging out the middle and leaving the face irregular.

How to Hold the Tool.—The manner of holding the tool on the stone depends, of course, on the kind of tool, and somewhat, also, upon its temper. Whether it should lie square, or diagonally across the stone, is held to depend altogether on whether it is intended to cut with a direct or an oblique stroke—or, technically, with a crushing or a sliding stroke. Mechanics who are adept in the art of grinding, hold square across the stone those implements that cut with a crushing stroke, and apply diagonally those which cut with a sliding or drawing stroke. The sliding stroke is far more effective, and belongs to the scythe, sickle, and razor, and partially, also, to the ax, shaving-knife, pocket-knife, and straw-cutter. The crushing stroke belongs to the mortising chisel, plane, auger, cold chisel, mower and reaper-cutters, shears, and many other common implements.

The edge of tools that cut with a crushing stroke should usually be ground keener and on a more obtuse angle; while the edge of tools that cut with a sliding stroke may be coarser and thinner.

The tool with a sliding stroke really *cuts by sawing*, and is most effective when its thin edge bears a slight serrature or indentation, scarcely visible to the naked eye, but standing out uniformly under a microscope. These denticles should lean, at a slight angle, in the direction the tool is to slide in cutting, like the teeth of a well-set saw.

To secure this edge, all sliding tools should be applied to the stone obliquely, so that the scratches of the grit shall appear diagonally across the basil of the blade, and thus lay the serrature in that direction. In a scythe, the edge should be ground diagonally from heel to point, as shown in the annexed cut, representing a section of a well-ground scythe, microscopically exhibited. The scratches on the side are produced by grinding, and result



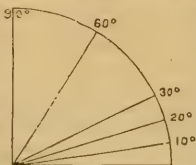
in the fine teeth visible at the top or edge of the blade. The letter *a* indicates the end toward the point. In grinding a scythe, hold the heel farthest from you, and the edge toward you, and apply the blade so that the stone will revolve toward the edge, instead of from it.

It requires almost as much care and skill to whet a scythe well as to grind it well. The rifle should be of fine grit, especially if your blade is a little soft, and it should be handled dexterously and laid flat on the basil at every stroke. Don't whet too often, or your neighbors will rightly conclude that your tool is poor, or, more likely, that you are either unskillful in whetting or indolent in mowing. Better wear out your scythe with the grass than with the rifle.

We have used the scythe for our illustration, notwithstanding that it is becoming rapidly obsolete, because it is a representative of other edge tools that require similar treatment.

The Angle of the Edge.—The angle to which the edge of tools should be drawn, depends, as already intimated, upon whether they have the sliding or crushing stroke. The Young Farmer's Manual, a book which every farmer ought to aspire to own, states the obvious fact that "the more acute the angle of the basil is, the less will be the force required to make it

cut," and represents that "the angle of the basil of a scythe is usually about five degrees—very acute," the angle of a cold chisel fifty degrees, the angle of drawing-knives and straw-cutter knives twenty degrees, and framing-chisels, plane-irons, and mower and reaper-knives, twenty degrees or a little more. Scissors should be ground at an angle of sixty degrees; as should also all tools that are to cut iron, for this is "the angle of strength."



We have no room for instructions in sharpening mower and reaper-knives, chisels or augers, or in filing or setting saws. The farmer, if he be ingenious, will readily acquire skill in either.

Sharpening Tools Chemically.—The following is translated from a German scientific journal, for the benefit of mechanics and laborers: "It has long been known that the simplest method of sharpening a razor is to put it for half an hour in water, to which has been added one-twentieth of its weight of muriatic acid, then lightly wipe it off, and after a few hours set it on a hone. The acid here supplies the place of a whetstone by corroding the whole surface uniformly, so that nothing further than a smooth polish is necessary. The process never injures good blades, while badly hardened ones are frequently improved by it, although the cause of improvement remains unexplained. Of late this process has been applied to many other cutting implements. The workman, at the beginning of his noon spell, or when he leaves off in the evening, moistens the blades of his tools with water acidified as above, the cost of which is almost nothing. This saves the consumption of time and labor in whetting, which, moreover, speedily wears on the blades. The mode of sharpening here indicated would be specially advantageous for sickles and scythes."

Old saw files may be renewed by cleaning them of grease and putting them in a dilution of sulphuric acid—one ounce to a pint of water, till the acid has brought the teeth to an edge.

List of Farming Tools.—We give here a list, prepared by J. J. THOMAS, of the principal implements and machines needed to furnish a hundred and fifty acre farm devoted

to mixed husbandry, and their approximate cost:

3 plows fitted for work (steel plows are best).....	\$34 00
1 subsoil plow; 1 double Michigan plow.....	24 00
1 one-horse plow; 2 cultivators.....	22 00
1 harrow, \$12; 1 roller, \$10.....	22 00
1 corn-planter; 1 seed-drill.....	15 00
1 wheat-drill, \$65; 1 fanning-mill, \$25.....	90 00
1 root-sheer; 1 straw-cutter.....	20 00
1 horse-rake; 2 hand-rakes.....	10 00
2 farm wagons; 1 one-horse cart.....	190 00
Hay-rack; harness, etc., for cart.....	35 00
1 sled and fixtures, \$30; 1 combined mower and reaper, \$125.....	155 00
2 scythes; 1 grain-cradle.....	7 00
1 shovel; 1 scoop-shovel; 2 spades.....	5 00
2 manure-forks; 4 hay-forks.....	6 00
1 horse-fork for hay, \$10; 1 pointed shovel, \$1.....	11 00
1 pick; 1 crow-bar.....	3 00
2 hammers.....	5 00
Large and small steelyards, \$3; half-bushel, \$1.....	4 00
1 maul and wedges; 1 ax; 1 wood-saw.....	4 00
1 wheelbarrow; 1 grindstone.....	8 00
Hand-hoes, baskets, stable lantern, currycomb, hammer, etc.....	5 00
1 endless-chain horse-power threshing-machine and separator.....	160 00
1 circular saw.....	30 00
Platform scales for weighing cattle, hay, etc.....	100 00
Total.....	\$965 00

Modern Inventions.—We have said that the scythe is becoming obsolete. So are many other tools familiar to every adult farmer, and only a few years ago, deemed by him quite indispensable. Nothing shows progressive agriculture in a more striking light than the rapid change in farm implements. More labor-saving machinery has been invented and brought into practical use upon the farm during the generation in which we write, than in all the previous history of the world!

Compare the old wooden mold-board bull-plow with the modern self-polishing cast-steel counter-draught, or with the rotary plow that seems likely soon to hold the field against all rivals; the old-fashioned flail with the horse-power threshing-machine; the clumsy methods of sowing with the improved drill; the ancient scythe that could lay two acres a day at the expense of considerable cider and a lame back, with the mower that cuts ten times as much; MAUD MULLER's drowsy rake, with the revolving horse-rakes that are driven by farmer's daughters across the prairies, sweeping up the windrows like the wind! An all-absorbing enterprise and a brisk utility seem to be driving meditation from modern life. If there is any pastoral poetry left, it is laughed out of propriety by the patent-tedder skipping glibly about the field like an industrious grasshopper, or drowned in the hum of the reaping-machine that

"—cuts the bearded plant at a breath,
And the flowers that grow between."

The following cuts represent some of the ancient methods of sowing and harvesting, among

the Normans, the cut being made from a de-
lineation in an old manuscript:



Reaping.



Sowing.



Threshing.



Whetting Scythe.

NORMAN AGRICULTURE.

Without the improved machinery of the present day that performs the labor of so many men, it would be quite impossible to gather the harvests of this year. The farmers of New England, compelled to till rocky and rugged land, and accustomed to small holdings, are not, generally, aware of the complete revolution wrought by improved machinery on the great Western prairies. "Now," says S. E. TODD, "the infirm and the invalid, the lame and the lazy, who could never plow the fields, harvest the grain, or make the hay of a small farm, can ride to plow the land; ride when putting in the seed; ride when scattering their fertilizers; ride when cultivating the growing crops; ride when mowing or harvesting; ride when raking, and ride in an easy seat and accomplish more hard work in one hour than could be done in ten hours a few years ago, even by laboring with all the might of a strong man."

We saw recently a corn-field on the Grand Prairie, in Illinois, in the plowing, planting, cultivating, and harvesting of which no man walked a step. A rotary spader, drawn by four horses and driven by a man upon the box, plowed the field to a uniform depth of eight inches, and gave such thorough tilth that it was not necessary to use a harrow at all. A corn-planter, drawn by two horses and driven by a man upon the box, next planted the seed. A cultivator, drawn by two mules, one walking on each side of the knee-high corn, and driven by a man upon the box, completed the culture of

a row at a single operation. In the tool-house lay another machine, also to be driven by horses, which was to cut down the corn when it was ripe, and still another machine to do the husking at the rate of fifty bushels an hour! What were the dear old fairy stories to this?

When it is remembered that the farmer who follows a common plow, or cultivator, during a long Summer's day, performs a march of from ten to fourteen miles, it will be seen what a boon is the machinery which relieves him from this toil.

The farm of which this corn-field was a part, had seven hundred acres in a single field of timothy. Of what use would this be if it had to be cut by hand? But half a dozen harvesting machines suffice to cut it all in good time, and will do, without groaning, the work of half a regiment of men; patient horse-rakes gather it up; and two hay-presses upon the place compress it into bales fit for transporting. Seventeen and a half miles of board fence inclose a little more than half of this farm, which has, as part of its furniture, comfortable sheds for ten thousand sheep, a corn-crib, rat-proof, holding fifteen thousand bushels of corn, and extensive stabling for horses.

The Best Tools are the Cheapest.—The best farm implements are always the most profitable to buy; to express it paradoxically, the dearest are generally the cheapest. The amount of capital invested in them by our citizens is beyond comprehension; J. J. THOMAS, in an excellent essay in the United States Agricultural Report, for 1862, put it at five hundred million dollars! How much of this is invested in poor tools? and all poor tools are a bad investment, because they result in a loss equal to ten times their cost.

The best steel hoe, light and well hung, may enable a laborer to do a fourth more work than a heavy and clumsy one, and this will amount in a season, to several days' work—many times the difference in expense. COLLINS' cast-steel plow may cost five dollars more than a coarse cast-iron one, but it will last thrice as long and perform one-fifth more work with the same power. A laborer shoveling earth with a shovel only one pound heavier than a neatly-made light shovel, will exert strength to no purpose sufficient to throw up one pound of earth at every shovelful, which would amount to several tons in a short period of time. So of mowers and reapers, rakes and threshers; a machine that will perform one-fifth more work than another, with the same power, is

usually worth twice as much, while the difference in price is but a mere fraction of the difference in value.

In agricultural dynamics, the effective force of a horse, or a horse-machine, is computed to be equal to the power of five strong, active laborers. So a mowing-machine, drawn by two horses and driven by a man, should be, and a good one actually is, equal to the work of eleven men. From this calculation, it follows that a machine that will cut one-tenth more grass than another, is worth enough more to pay through the haying season the board and wages of one man. Our best mowers and reapers, horse-rakes, hay-tedders, horse-forks, and threshing machines, possess wonderful efficiency, and in some instances so far exceed this standard of merit that comparison makes the standard appear insignificant.

Mr. TODD, already quoted, estimates that an average day's work for a man, in flail-threshing and cleaning grain, is as follows: "Seven bushels of wheat, eighteen bushels of oats, fifteen bushels of barley, eight bushels of rye, or twenty bushels of buckwheat." For a threshing machine he makes the following figures: "In order to labor economically and advantageously with a threshing machine, two horses, at least, and three men are necessary. In most instances four or five men will be required, which will make a force equal to fifteen men with flails: Such a gang of hands, and two good horses, with such a thresher and cleaner as HARDER'S, are capable of threshing and cleaning, of the same kind of grain to which allusion has been made, one hundred and seventy bushels of wheat, three hundred and twenty-five of oats, two hundred and twenty of barley, one hundred and eighty of rye, or two hundred and sixty of buckwheat."

The farmer who buys the poorest machinery because it is the cheapest at first cost, makes the same mistake as the gardener who bought poor seed because it was "cheap," or the teamster who favored his sick horse by giving him the short end of the whiffletree.

We shall refer briefly to some of the recent improvements in Farm Machinery, premising that this short treatise is only intended to be suggestive, not exhaustive. Every year brings enough additional improvements to make a volume.

The change wrought in implements of preparatory tillage are fewer than those in the departments of culture and the harvest, yet they are sufficient to justify a running historical

sketch. First in order, as first in the field in Spring, is

The Plow.—The plow, in its primitive form, must have been one of the earliest implements fashioned by the human hand. We can scarcely be certain that CAIN had a plow, when, a young man of a hundred and fifty, he farmed it in the suburbs of the city of Enoch, "to the eastward of Eden;" but even ADAM might have survived to see one, for he is said to have lived the best part of a thousand years, and doubtless saw the sparks fly from the anvil of TUBAL CAIN, his blacksmith descendant of the fourth generation.

Both MOSES and SAMUEL speak of a plow, which, like the modern plow, was drawn by a yoke of oxen, as it was forbidden by law to yoke an ox and an ass together. The early Greek plow had a wheel. Most of the old rustic authors referred to the plow; VIRGIL wrote of it in the *Georgics*; HOMER sang of it; and PLINY, HESIOD, and STRABO spoke of the methods of making it. VARRO mentions a plow with two mold boards.

Ancient Plows.—The first plow of which we have any delineation is figured roughly on the monuments of Egypt. Figure 1 is believed to represent the original of all plows.



Fig. 1—ANCIENT PLOW.

It was sometimes formed of the limb of a tree, and sometimes of the body and tough root of a sapling; the lower end being hewed to a wedge. The plowman occasionally worked the implement by himself, applying his foot to the projecting pin, like a spade; but was oftener assisted by a team composed of a grown daughter and her mother, or it may be her grandmother attached to it by rawhide or hempen thongs. This same contrivance, shod with iron, is at the present day used for a plow in the Hebrides.

The plow still in use in Palestine (figure 2,) is made entirely of three sticks, adjusted to support each other, as shown in the illustration. This is



Fig. 2.—PALESTINE PLOW.

drawn by a cow or an ass; sometimes by a camel and buffalo yoked together.

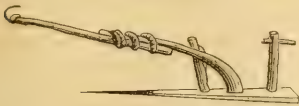


Fig. 3—CHINESE PLOW.



Fig. 4—MANGALORE PLOW.

Figures 3 and 4 exhibit the plows of China and the East Indies. These do not seem ever to have improved or changed in any important

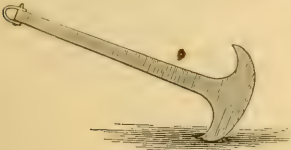


Fig. 5—ROMAN PLOW.

respect Figure 5 represents the earliest Roman plow, which had hardly a rival in simplicity and rudeness. It appears to have been fashioned on the principle of the pickax. In later times was much improved.



Fig. 6—NORMAN PLOW.

Figure 6 is an engraving of a Norman plow and plowman, from a sketch found in an ancient British manuscript. The plowman carries a hatchet to break the clods; and the faulty perspective shows it to be about as large as his team.

The plow of the ancient Britons was very rude; no man was regarded as fit to be a

farmer until he could make his own. The custom was to fasten the plow to the tails of the horses or oxen, and compel the beasts thus to drag it through the ground. An act of the Irish legislature was passed in 1634, entitled, "An act against plowing by the taile," which forbade the cruel custom; but it was still practiced in some parts of the island until the present century. The draft-pole was lashed to the tail of the horse, and as no harness was employed, two men were necessary, one to guide and press upon the plow, the other to direct the horse, which he did by walking backward before the miserable animal, and beating him on the head on either side, according to the direction required. The old Scotch plow was thirteen feet long; the iron part proper being over four feet.

Modern Plows—JETHRO TULL, an enterprising Englishman, in the early part of the last century, paid considerable attention to improving the plow, and advocated deep tillage as necessary to good husbandry. The Dutch, however, were the first to bring the plow a little into its present shape. A century ago JAMES SMALL, an ingenious Scotchman, was fashioning the first cast-iron mold boards at his factory in Berwickshire; and twenty years later, ROBERT RANSOME added cast-iron shares, and soon learned to case-harden them.

A few years later, in 1797, CHARLES NEWBOLD, of New Jersey, obtained a patent for the first cast-iron plow, but the farmers were so overwhelmingly in favor of the old wooden "bull plow," that he had to succumb to the opposition, after spending a fortune to introduce his invention. About the same time THOMAS JEFFERSON published a scientific treatise, describing a plow of which he demonstrated that the shape of the mold-board was mathematically correct to obtain a perfect furrow with the lightest draft.

But to JETHRO WOOD, of Cayuga county, New York, more than to any other man, does America owe a debt of gratitude, for his energetic labors and sacrifices in perfecting, and bringing into general use, the cast-iron plow. He was opposed with the greatest bitterness and vigor; was charged with trying to ruin the wood-plow makers and to "poison the soil" with his mysterious cast-iron; but he never turned aside. It is said of him that he whittled away bushels of potatoes, before he was able to bring out a miniature form of a plow that suited him. Large potatoes were whittled into almost every conceivable form

before the present convenient and efficient curve of the mold-board was attained. Although Mr. WOOD was one of the greatest benefactors of mankind by this admirable invention, he never received, for all his thought, anxiety, perplexity, and expense, a sum of money sufficient to defray the expenses of a decent burial.

Through the genius and unflagging zeal of JETHRO WOOD, and of those who have succeeded him, the cast-plow was introduced upon every farm in the Union, and has been the means of effecting a pecuniary gain, in the aggregate, of several hundred million dollars.

What is a Good Plow?—America furnishes a great variety of good plows, calculated for hill and plain, for all sorts of soil, and for every breadth and depth of furrow. For an intelligent farmer to select a good plow from among these is not difficult. We need not remind the reader that one plow will not do all kinds of work, any more than one auger will bore holes of all sizes.

Every farmer buying a plow, should insist on taking it *on trial*; this is far more satisfactory than a warranty, because the implement may be really a good one, but not adapted to the soil or the work required. Let the buyer make sure that its shape is such that it will turn the soil well; that the wing is wide and cold chilled; that the mold-board is high enough and twisted enough, even if the plow runs a foot deep, to fling all the earth out upon the slice, instead of spilling it over into the furrow; and that it is easy of draft.

The Universal plow, invented by Governor HOLBROOK, of Vermont, and manufactured by NOURSE, MASON & Co., of Boston, is a valuable invention. It admits of a ready replacing of one mold-board by any other, according to the intended purpose or variation of the soil, several mold-boards belonging to each plow. This is one of the very best of cast-iron plows. Several manufacturers of cast-iron plows in this country produce a great variety, in no less than a thousand different kinds and sizes—as the Peekskill Works at Peekskill, New York; REMINGTON & Co., of Ilion, and ALDEN & Co., of Auburn, and AMES & Co., of Boston.

Sheet-Steel Plows.—On the prairies of the West, and in other rich, adhesive molds, cast-iron plows are impracticable; they scratch, and will not scour or run clear. So, at an early day, it was found necessary to introduce steel. The first steel plow was made, some forty years ago, by JOHN LANE, near Lockport, Illinois, by welding together saw-mill saws in a sheet

for a mold-board. This was found to be an immense improvement on cast-iron, and sheet-steel plows have since generally been used in the sticky soils of the West.

But even these have failed to answer perfectly. To produce a uniform temper has been found quite impossible; so that, while one plow works admirably, the next, from the same maker is good for nothing—either it will not properly scour, or will soon wear out in gritty soils. The fiber and grains of the steel are often injured in the process of rolling and bending; and only a moiety are brought to the requisite temper for a good scouring plow. For years there has been an impatient demand for a better and more reliable steel implement. And at last the demand has been answered.



THE COLLINS PLOW.

The Collins Plow.—In 1860, F. F. SMITH, an ingenious mechanic of Illinois, disheartened in a prolonged effort to produce a sheet-steel plow of uniform excellence, made his appearance at the Collins' works, in Hartford, Connecticut, a corporation already celebrated in the manufacture of axes and other tools—told what sort of a plow he thought was needed on the prairies, and said he believed he could make it.

The company cordially joined him, and the result was a plow, cast solid, in iron molds, from molten cast-steel—the first ever made. It was found equally adaptable to turf, stubble, and fallow; and those who have used it in the West, aver that it will easily scour and polish in any soil; that it takes less friction and draws lighter than any other plow of the same furrow; that it will plow perfectly from three to twelve inches in depth; that it will last five times as long as the cast-iron plow, and twice as long as the sheet-steel. Moreover, these plows are of uniform excellence. Another palpable advantage is, that any section of the plow can be duplicated at any time at a trifling expense in case of damage. The share can be sharpened by any blacksmith, as it is perfectly malleable; and cold and cabinet chisels, cork-screws, and knives, have been repeatedly made from fragments of these plows in different parts of the country, to test the steel. Of some such stuff

must the plows have been made that turned up the valley of JEHOSAPHAT; for JOEL (chap. iii, verse 10) calls upon the farmers to forge them into swords.

One hundred of these plows were made, and sold with great difficulty, in 1861. Now fifteen thousand a year are turned out, and an aggregate of fifty thousand are inverting the sod of the West. Indeed, this cast-steel plow seems likely to supersede entirely the sheet-steel, wherever the latter has superseded the cast-iron.

New Double Furrow Plow.—A new plow, in which some novel points of construction are worthy of remark, has lately been introduced in Great Britain. It turns two furrows at the same time, one share being slightly in advance of the other, and is claimed to save so much draft as to be able thus to accomplish double work with only the usual expenditure of power—requiring two or three horses, according to the nature of the soil. Without an illustration it is difficult to describe it very clearly, but as appears from a small engraving before us, it has two wheels, one in front and one in rear, both set at such an angle and so shaped as to run against the side as well as on the bottom of the furrow—the one in advance running at the right in the furrow previously opened, and the back wheel at the left in the last furrow made by the plow itself. The landside and sole of the ordinary plow are wholly dispensed with, the wheels answering the purpose completely, and sustaining the whole thrust caused by lifting and turning the furrow-slice. This substitution of a rolling for a dragging friction, and the manner in which it is accomplished by the position and form of the wheels, effect the saving in draft which enables two furrows to be turned at one operation.

Subsoil Plows.—The subsoil plow is drawn in the furrow made by the common plow. Its office is to break up the compact and imperious substratum of heavy soil, generally leaving it in the furrow where it is broken up. In regard to advantages of this, we quote from the essay of Mr. THOMAS: A considerable diversity of opinion prevails as to the value of these plows. As it usually happens in such cases of diversity, all are more or less in the right. Farming, as much as any occupation, requires a constant exercise of the judgment, or a combination of sound reasoning powers with experience and observation. The farmer must vary his practice with circumstances: 1, A soil already deep and loose does not need subsoiling.

A gravelly bottom to the furrows would be little better after the passage of this implement. 2. A sterile subsoil supporting a rich topsoil would only serve, when loosened, as a regulator of moisture, receiving water like a sponge during the time of heavy rains, and retaining it for periods of drought. It would not, of course, add to the fertility of the bed in which the roots of the crop extend themselves. 3. A heavy and undrained soil would be benefited only temporarily. The first heavy soaking it received would settle the whole mass back again nearly to its original degree of compactness. 4. But for any hard subsoil, whether sterile or not, if naturally or artificially underdrained, subsoiling can scarcely ever fail to be substantially useful, and its benefits last some years without a repetition of the process.

If the subsoil is sterile, as already mentioned, it becomes a reservoir or sponge, and tends to prevent both drowning out and drought; and the gradual deepening process, which the best farmers desire, may be effected through its assistance, by permitting the common or trench plow to run a little deeper into the mellowed bed each successive year. There is nothing which will enable that form of the trench plow, known as the Double Michigan, to do its work in the most satisfactory manner better than a previous loosening by the subsoiler, whether it be done one, two, or three years previously: Where both surface and under soil are naturally fertile, its advantages are rendered eminently conspicuous, and in such a case the trench plow may be used to its full depth without fear, the mixing of the two portions proving usually of great advantage. Soils so treated have frequently contributed to a greatly increased growth of wheat, and invariably to larger crops of carrots and beets. The observing farmer will readily determine which of these different circumstances are his own, and act accordingly.

The object being merely to loosen up the under soil, a slight elevation of its substance, by means of the passage of a horizontal acute wedge a few inches below the bottom of a common plowed furrow, is all that is necessary. The shank connecting this horizontal wedge with the plow-beam should be thin, that it may pass easily forward through the subsoil. A good subsoil plow has no mold-board nor landside. The implement is properly a pulverizer.

Plowing with Three Horses Abreast.—This is somewhat practiced, and with certain advantage. Farmers have long since observed in

practice, that a horse will exert much more force when placed near the plow, sled, or vehicle to be drawn, than can be brought to bear when a long draught-chain placed the team more remote. An experienced stage proprietor has given it as his opinion, that three horses placed abreast will draw his vehicle as well as four with two leaders in advance, in the usual way. Experiments in plowing point to nearly the same conclusion, and it is according to the principles of draught. The new center of draught can be adjusted by a clevis bent several inches to the left side of the beam. Three horses are driven by the plowman with the same facility as a two-horse team, and do not require an additional driver, as becomes necessary with four. As a deeper cultivation would improve the character of farming, in all places where the quality of the soil properly admits it, there is no doubt that the general adoption of the three-horse system would become a considerable agent in improved agriculture.

Steam Plowing.—In the benefits of the activity of agricultural invention, the plow has not fully participated. From the old bull-plow to the COLLINS or COMSTOCK's Rotary Spader, there is nothing like the stride that there is from the sickle to the Buckeye reaper.

A new plow is now needed as much as a new reaper was. The old depth of cultivation ought not to be longer continued. Men have learned that a wealthier Republic underlies the present Republic; that three thousand million dollars are buried within six inches of the present depth of culture. But this treasure can not be economically mined except by the power of steam to propel the plow. It can not be that the means of doubling the present depth of plowing are more difficult of attainment than the reaper, the sewing-machine, the locomotive—yet the steam plow is as important as either.

Half a dozen steam plows have been patented every year in this country for the last ten years; yet none have proved successful. The inventors generally retain the principle of dragging the plow through the soil, though all experience has tended to show that the implement that is at last to succeed will stir the earth by a rotary motion.

The only steam plow that has practically proved successful to any considerable extent, is FOWLER's traction-gang plow—an English invention. These plows have been in use in England for fifteen years, and four thousand of

them are at work there. The Viceroy of Egypt has also four hundred of them in use in his dominions; and the result is a vast improvement in culture, and a remarkable increase in the cotton crop. There are now (1869) only four of FOWLER's plows in use in the United States—one in Louisiana, one in New Jersey, and two in Illinois.

By the plow now working in Louisiana eight acres of ground per day are broken up, being plowed fourteen inches deep through a soil of unsurpassed toughness; after which the steam cultivator is used, which occupies a place between a large harrow and a subsoiler, piercing the ground to a depth of sixteen to eighteen inches, and operating as a great pulverizer. This plowing is accomplished at a cost of \$2 25 per acre; the cultivator preparing twelve acres per day, at a cost of about \$1 50 per acre. In England it is held, upon competent authority, that, including interest on the investment, depreciation, and repairs, the average yearly cost of maintaining a set of steam-cultivating machinery, breaking and cultivating two thousand acres; ten or twelve inches deep, is not more than five hundred dollars, or seventy-five cents per acre.

Commissioner HORACE CAPRON says of the New Jersey plows (Colonel PATTERSON's) whose working he witnessed: "The gang of plows consisted of twelve, six operating at a time, driven by two fourteen-horse power engines, one at each end of a series of sixty-rod furrows; the breadth cultivated at one movement was seventy-eight inches, the depth eight inches, and the furrows were laid with faultless regularity, at a rate of speed which would insure the perfect plowing of at least eighteen acres per day, and under very favorable circumstances, twenty-five acres. The machine was guided easily by one man, and reversed at the end of the furrow without a moment's loss of time. The surface was rough, though the soil was a sandy loam, easy of cultivation."

It can not be that this is the Coming Plow, for it seems a clumsy device to station an engine at each end of the field, to drag the plows alternately by wires—it involves a waste of power not worthy of the ingenious age we live in.

Perhaps the phrase "steam plow" is ill-chosen; for it seems certain that, when steam is generally adopted as the motor, the plow, as such, will be dropped. The *rotary motion* seems to accord more with the genius of steam, and a rotary spader, like COMSTOCK's, is likely to be

adopted as its servant—some instrument that will thoroughly pulverize the soil, but not invert it. We coincide with M. L. DUNLAP, of Champaign county, Illinois, in the conclusion he has expressed in the United States Agricultural Report, that plowing with a steam traction engine is out of the question, for the following reasons:

1. This machine can not pass over soft land, whether wet or cultivated, as the soil yields to the motion of the drum or driving wheels, and, instead of carrying the machine forward, excavates a hole into which it sinks beyond its own power of rescue.

2. When loaded with a half day's supply of water and fuel, it is incapable of drawing the plows.

3. It can not rise the ordinary grades of the rolling prairie with the plow at work.

4. On level land it can not do the work as cheaply, under the most favorable conditions of water and fuel, as animal power.

The fact that these obstacles have not been overcome, accounts for the failure of the American steam plows thus far introduced—of BURRIDGE'S, HALL'S, HUSSEY'S, FAWKES', and WATERS'—some of which exhibited great ingenuity, and created much enthusiasm during their early experiments.

The Harrow.—Next to the plow, the harrow may be said to be the oldest agricultural implement. It is represented on the most ancient sculptures of Egypt, and it seems not to have materially changed its form. The great use of the harrow is in pulverizing the earth, tearing out and freeing the soil from the roots of weeds and grasses, and covering seeds when sown.

A good harrow ought not to cost more than ten dollars, even where a joiner is employed to make it. The best white oak is not too good, and the frame should be of 3 by 4 timber. The teeth need not be more than an inch square. If the harrow be square, thirty-two teeth are a common number; if it be triangularly winged, folding on hinges in the middle, twenty-four will be enough. The Shares' or coulter harrow is somewhat used; and, when the teeth are of steel, it is a most perfect implement for pulverizing the freshly inverted surface of sward land, to a depth two or three times as great as the common harrow can effect. The teeth being sharp, flat blades, cut with great efficiency; and, as they slope like a sled-runner, they pass over the sod, and, instead of tearing it up like the common harrow or gang-plow, they tend to

keep it down and in its place, while the upper surface of the sod is sliced up and torn into a fine mellow soil. No person who prepares sod for corn should be without this efficient pulverizer.

There is also a rotary harrow in market, which is thought by some who have used it to be a decided improvement over any other harrow in use. It is very efficient in pulverizing, leveling, and working itself clear of clogs. It is circular, built somewhat like a star-fish, and is drawn by a pivot in the center. An iron weight is borne in a box on one side, and kept in place by being supported by the frame in which the harrow revolves. This weight presses the teeth under and near it into the ground, which partially arrests their motion, and causes the harrow to rotate. This gives to every tooth in the harrow a *cycloid* motion, that is, they describe successive segments of circles, which segments are constantly crossing each other at various angles, so that the ground is really cross-harrowed as it moves straight forward.

J. J. THOMAS, the accomplished editor of *Rural Affairs*, has invented a harrow which has recently elicited much inquiry. It is made of pieces of plank, hinged together so as to fit uneven surfaces, and through these pieces a large number of spikes are driven, constituting the teeth. The teeth slant *backward* at an angle of about forty degrees, which cleans them of all rubbish, causes them to pass freely over stones or other obstructions, and prevents their tearing out the plants of corn, wheat, and other crops, which they are used to cultivate. At the same time they mellow and smooth the surface, and destroy all young weeds which are just making their appearance.

This harrow has been successfully used for harrowing wheat in Spring, brushing in grass-seed, mellowing the surface for receiving turnip and other small seed, smoothing ground intended for meadow as a substitute for the roller, and for destroying or preventing weeds among corn and other cultivated crops. It promises the most important value for the last-mentioned purpose, being likely to supersede entirely the labor of hand-hoeing.

Besides the varieties of harrow, there are large numbers of clod-crushers, manure-sowers, and other machines used in tillage, which we can not describe in detail.

Cultivators.—The cultivator is one of the most valuable of the farmer's labor-saving

machines, far surpassing the standard of usefulness given in a previous paragraph. The importance of a constant use of cultivators during the growth of drilled crops is not sufficiently appreciated. The remark has been made, and no doubt justly, that one day's work with horse and cultivator in a corn-field is worth ten with a common hand-hoe. A crop of corn may sometimes be doubled by a thorough dressing once a week with a good cultivator.

A serious defect in American cultivators at present is, the lack of rapidity and accuracy. Almost all crops ought to be planted with a drill, with such care that the rows shall be precisely parallel, and at a distance apart mathematically uniform. Then the cultivators should be so constructed as to finish two rows at once, and to run close to the plant without covering it. The perfect implement can not be very distant, for improvements are rapidly making. By reference to the Patent Office Reports for three years, at random, we find four hundred and fifty patents for plows and cultivators.

ALDEN'S thill-cultivator, for one horse, is much used and valued. The thills, under its motion, are more steady than that of the common cultivator, and the handles enable the operator to press it to the right or left, so that he may cut as closely to the rows as he desires. Formerly the teeth of cultivators were mostly made of cast-iron; now all the best ones are of steel plate. The steel are lighter, keep cleaner, keep sharper, and last longer.

In working with this cultivator, let the driver throw the reins over his head, and let one line rest upon his shoulder, the other passing under his opposite arm, when he can guide the horse by merely turning his body in the direction required, much easier and more efficiently than by holding a rein in each hand. The undivided use of the hands is required to hold and properly guide the hoe, to do the best work.

There are also a multitude of sulky-cultivators, drawn by two horses and carrying the driver, the plows or teeth being directed by the feet of the rider, or by a hand lever.

Drills and Planting Machines.—

The rapidity and precision with which small seeds are distributed and covered by the use of seed-drills, renders them absolutely necessary to the successful raising of such crops as carrots, turnips, beets, onions, etc., in fields. They are also coming considerably into use for the sowing of wheat, and the profitableness of the drill system is becoming more and more apparent.

These drills are of many varieties, and our limits preclude a notice of even a few of the best. The general principles on which they operate, the regular and measured distribution of the seeds, by means of revolving cylinders furnished with small cavities, or by the vibratory motion of perforated plates, and the passage of the seed down into the mellow earth through a hollow coulter, where it is immediately buried by the earth falling back upon it as soon as the coulter has passed—these principles of construction are adopted in all, and are familiar to all who use them.

The depth should be carefully adjusted by the operator, and he should remember that seeds are much oftener sown too deep than too shallow. It is estimated, by some of our most successful farmers, that by the use of the grain-drill they save from half a bushel to a bushel of grain per acre, and the yield per acre is several bushels greater than when the seed is scattered broadcast by hand.

There are numerous machines for planting potatoes, Indian corn, beans, peas, flax-seed, cotton-seed, and almost all kinds of vegetable seeds that are grown in rows or drills. At most agricultural warehouses hand-planters, costing three or four dollars each, can be obtained. These small planters are adapted to distributing only the seeds of carrots, beets, turnips, parsnips, etc. At a higher price can be procured horse-drills, adapted to large farmers.

At the West, Indian corn-planters, drawn by one or two horses, are extensively used; most of the corn in Illinois is planted in this way. Sometimes four-horse corn-planters are used. At the East, hand-planters have generally failed to give satisfaction, on account of the rocky and uneven character of the ground.

There are some hill-sides with which we are acquainted, where a musket, loaded with flint-corn, is the only "machine" with which it could be planted to advantage.

A reliable cotton-planter is manufactured at Hawkersville, Georgia. It is constructed somewhat like a small wheelbarrow; the hopper holds about a bushel and a half of seed; with curved bottom of sheet-iron, and made into two parts, capable of being compressed or separated by rods and screws. The wheel has a crank and connecting rod, which give a reciprocity motion to about half a dozen long teeth that pass just through the division of the box. The two sides can be screwed together so as to put half a bushel or less of the seed to the acre; or

the orifice can be opened so as to sow three bushels or more if desired. The long teeth pull down the cotton-seed as they move to and fro, and secure its dropping regularly.

TRUE's potato-planter is now much used. The machine is supported on two drive-wheels, similar to the driving-wheels of a mowing machine, and these work the dropping and cutting apparatus. In the bottom of the hopper which contains the potatoes to be planted, there is a sink on each side of a slide, which is worked back and forth by means of a crank or pitman. One or more potatoes drop down into the recess, when the slide forces the potato against a knife, which cuts off all that extends below the knife. After it is cut off, the piece or pieces drop down into the furrow that is opened to receive the seed. The furrow is opened by a small double mold-board plow, and the seed drops directly behind it, before the soil has time to fall back into the furrow. A scraper of peculiar form follows the plow, and fills the furrow with mellow soil, covering the potatoes as neatly as it can be done by hand. Immediately in the rear of every other part of the planter there is a cast-iron roller, which rolls every row. The drive-wheels make marks sufficiently distinct, where the land is well prepared, for a guide, when returning, to enable the operator to plant the rows the desired distance apart.

Mowers and Reapers.—SOLOMON was evidently more than half right when he said there was "nothing new under the sun." Many suppose the mowing and reaping machine, at least, to be a comparatively recent invention. Yet grain was reaped by machinery as early as the time of PLINY the elder, who lived in the days of JESUS of Nazareth, more than 1800 years ago. This historian said, as translated by PHILIP HOLLAND, of London, in 1601:

"As touching the manner of cutting down or reaping corne [wheat], there be divers and sundry devices. In Fraunce, where the fields be large, they used to set a jade or an ass unto the taile of a mightie great wheelebarrow, or cart, made in manner of a van, and the same set with keene and trenchant teeth sticking out on both sides; now is this cart driven forward before the said beast upon two wheeles into the standing ripe corne (contrairie to the manner of other carts that are drawne after): the said teeth or sharp tines fastened to the sides of the wheelebarrow or cart aforesaid, catch hold of the corne ears and cut them off; yet so as they

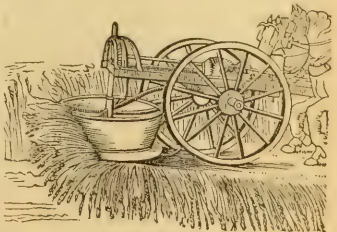
fall presently into the bodie of the wheelebarrow."

PALLADIUS, an Eastern ecclesiastic, also described the Gallic reapers in 391 A. D. They had apparently received some improvement, as the writer speaks of "the driver regulating the elevation and depression of the teeth with a lever."

These reapers seem to have fallen into disuse for a thousand odd years, to be revived by some ingenious student of history in Great Britain in 1785. In the details of this machine, a drive-wheel, pulleys, pinions, tooth-wheels, and iron-combs or teeth are mentioned. In 1799, another reaper is spoken of as being propelled by a horse hitched behind it, which cut and laid the grain in a swath on one side of the reaper. A boy could manage this machine, and a horse could draw it, cutting a swath about two feet wide, or rather more than could be reaped in the same time by six men, with sickles.

In 1806, Mr. GLADSTONE produced a reaper for cutting grain, delivering the straw into gavels to be bound. The machines were still pushed ahead of a horse or ox. The next year, Mr. PLUNKETT adjusted the gearing so that the horses dragged it against the grain.

Thenceforth, patent followed patent rapidly, and the clumsy machine became more shapely, though the present adjustment of knives had not yet been attained, and the finger-bar was not yet invented. In 1815, a citizen of Deans-ton, in England, who comes down to us under the generic designation of "Mr. SMITH," invented a reaping machine, "which," says JOHNSON, "in some experimental trials, appeared to perform its work exceedingly well; but, upon longer trial, has not answered the favorable



SMITH'S REAPER-1815.

expectation formed of it." The reason of its failure is disclosed by the cut of the machine. It was pushed against the grain, which was reaped and carried to the stubble by a vertical cylinder, with an edged flange at the bottom,

revolving rapidly. A Mr. WILSON introduced this invention into the United States, but even with his "improvements" it could not succeed.

It was not until 1826 that Rev. PATRICK BELL, of Carnylie, in Scotland, introduced his invention of the reaping machine. This caused a complete revolution in the methods of harvesting, for it was a vast improvement on all that had gone before, and became the model for those which followed. The arrangement of the cutting gear was similar to that of the machines of the present day. This reaper could cut ten acres in ten hours, and sold for \$250. Several were constructed and operated on his plan, and four of them are said to have found their way across the Atlantic. The inventor received a prize of £50 from the Highland Society, but seems to have obtained no other compensation for his labor and ingenuity. He was said to be still living in his parish last year. A testimonial from the mower-and-reaper manufacturers would be the most appropriate recognition that he could receive for his valuable public services.

OBED HUSSEY, of Baltimore, afterward of Cincinnati, was the first American to improve on the invention of PATRICK BELL. He imported the English machine, and bettered it, and a large number were manufactured by his brother, T. R. HUSSEY, at Auburn, New York. We present a cut of this machine, in action, as



OBED HUSSEY'S REAPER.—1840.

printed in the *New Genesee Farmer* of May, 1842. Accompanying it is the inventor's statement, minutely describing the machine, and gravely informing the public that "by several years experience, I have been enabled to add much to the durability of the machine, which I apprehend can now receive but little improvement further than I shall make this year!" The machine looks clumsy enough, but it was an efficient implement, being "warranted to cut fifteen acres of the heaviest wheat in a day, and save it much cleaner than is usually done by a good

cradler, and to cut the whole season without sharpening." We need not say that it sometimes fell below the warranty. Its price was \$150.

Soon after this, the celebrated McCORMICK reaper entered the field, astonishing Americans as well as the farmers of the Old World. It was cheaper, lighter, and every way better built and more effective than anything that had preceded it, and has, since its auspicious debut, undergone constant improvement. From that time to the present day, reapers and mowers of innumerable forms have come into existence, many of which have ended in total failure, while others have resulted in as signal success.

OLON ROBINSON, in the *Tribune*, considers himself able to state "that the number of reapers and mowers manufactured in this country in the year 1864, was between 85,000 and 90,000 machines. In 1865 the number built did not vary 5,000 from the number in 1864. The total number built each year should have increased largely since that time, but we will not attempt even approximately to estimate it. The manufacturers of the WOOD self-raking reaper and mower, claim to have sold, in the aggregate, more than one hundred thousand machines. Mr. TODD says: "I ascertain that in 1864, more mowers and reapers were manufactured in the county of Cayuga—and most of them in the city of Auburn—New York, than in any other city or county in the world."

We have now a score of mowers and reapers that work beautifully. Fortunes have been expended in bringing some of them to their present state of perfection; no time or money have been spared to turn out a perfect labor-saving implement. According to the reports of committees, where the most extensive trials have been had, the Buckeye stands at the head; while at its side stand the Clipper, Wood's, and Kirby, and following closely are the Clough, Manny, New Yorker, Champion, Climax, Warrior, Quaker, Syracuse, Marsh harvester, and numerous others.

At the national contest for "the championship" at Auburn, New York, in 1866, there were more than fifty entries of mowers and reapers—probably a larger number than ever competed at any other single trial. The contest continued for two weeks, and the great gold medal was awarded to the Buckeye, and the second prize to the Clipper. Other fairs have confirmed the justice of this preference.

One machine excels in one point, and another in another; the Buckeye was awarded the prize

for superiority in the greatest number of points—quality of work, easy of draft, durability, side draft, and portability. The MARSH Harvester has a narrow platform upon which two men stand and bind the grain as it is delivered to them on a revolving apron. All these machines are made stronger than formerly, lighter, more durable, more efficient, and of easier draft; and, what is not least in importance, the best ones cut as perfectly when moving at the rate of one mile per hour as when going three or four miles as was formerly necessary.

In 1868, Mr. ROBERT STONE, of Fulton, Wisconsin, cut thirty-two acres of wheat with a CLOW reaper, and deposited it on the ground with one of CRAWFORD's droppers, between sunrise and six o'clock, P. M.—the thermometer standing at 90° degrees in the shade.

A good mowing machine ought to cut a thousand acres of grass before wearing out, and at a cost of about twenty cents a ton, while mowing by hand costs at least fifty cents a ton at moderate wages. The horse-tedding and raking are effected with still greater comparative economy.

Self-raking reapers, are common and are growing in favor.

There is also a wide demand for a good one-horse mower, that can be adjusted to serve as a reaper. There are thousands of moderate farmers in every State, who are not able to purchase separate machines to mow their few acres of grass and to reap their few acres of grain. The machine that will adapt itself to the various kinds of work to be done on a small farm, is an implement that will always be largely in request. A machine that a farmer can work alone in grass and grain is a labor-saving machine of great value. The implement that is simple, cheap, and, within its smaller range, as effective as more expensive machines, is the machine for the million.

The committee on mowers and reapers at the National trial at Auburn, gave considerable attention to the comparative merits of wooden and iron frames, and they give the preference to the former for the following reasons: "1, The iron frames are more easily, and, therefore, more frequently broken than wooden ones; weak spots and flaws are more easily concealed from the knowledge of the manufacturer and the purchaser; 2, If the wooden ones are broken the broken part is more easily and cheaply replaced than when made of iron, workmen in wood are also more easily accessible than workmen in iron; 3, the elasticity of wood is more

favorable to the successful working of the machine than the rigidity of iron; 4, it makes less jar and noise, and the nuts do not work loose so quickly; 5, it is lighter, and, therefore, draws easier."

Self-Binding Reapers.—There is now an earnest demand for a reliable binder-attachment. The *Cultivator* speaks of a self-raking and binding harvester, invented by J. F. GORDON, and adds: "The only question that arises is, whether a machine as rigid and complicated as one would suppose such a machine must be, can stand the work without frequent repairs. That it will cut, rake, and bind wheat at one operation, and do it well, is an undoubted fact."

W. W. BURSON, of Rockford, Illinois, also made a binder some years ago, but it was not a success because it had to be operated by hand.

Carpenter's Automatic Binder.—This self-binding reaper, invented by S. D. CARPENTER, of Madison, Wisconsin, has already worked two seasons in the field, and although certain defects in the gearing still need to be remedied, the machine works so beautifully and promises such complete success, as to justify a description.

The sickle and cutter-bar are constructed in the usual way, but here all comparison with other harvesters ends. The reel has a raking device attached, which is operated by a simple wooden cam and two elbow-levers, so arranged that the rake comes down in front of the sickle, performing the office of a "beater"—dividing the bundle in the standing grain. As the rake swings around to the point where the grain is cut, it remains rigid, while the arms that support it being freed from the cam, are allowed to fall gradually, so as to be at right angles with the vertical arms of the reel, and, by means of guide rollers, to pass along on ways, nearly parallel to the inclined platform, thus pushing the bundle endwise to a rear platform.

The loose bundle now appears spread partially under the automatic binder, which is located behind the driver's seat. A rake pushes across the platform, and returns with the gathered straw, releasing it to a hedge of curved fingers. These draw it half round and upward, compressing it between converging bars more firmly than any manual power could do, and giving it the form of a sheaf. While in this grip, a rotating arm, to which a shuttle is attached, passes around the bundle with one end of the wire until it meets the main wire,

when the ingeniously-contrived "twister" wheel within the shuttle, engages with a circular rack, which gives the wire four twists. The wire is cut by automatic shears, and the finished sheaf, tight and firm, drops of its own weight. The whole operation is done without any human assistance, and the team moves fifteen feet to each bundle. The machine binds a bundle the size of a man's arm as firmly as one a foot through. A grain box under the binder received all the shelled grain and loose heads—a saving of five to fifteen bushels a day.

As an appendage to the whole, there is a dropper outside of the binder, which carries the sheaves until there are enough for a rick, when it dumps them and sets itself again.

CARPENTER has also invented an attachment to threshing machines that will cut the wire and strip it off as the sheaf goes in, thus providing against harm to cattle that eat the straw. The binder works with wonderful precision, and certainly foreshadows a revolution in wheat-harvesting. A company is now forming in Madison for its manufacture. We can not doubt that some such machine will bind half the grain in America in 1880.

GEORGE P. GORDON, of Ohio, has also succeeded in constructing an automatic binder, which receives the straw from the platform where it falls. The chief difficulty met with by the inventor has been to keep the cross-rake out of the way of the falling grain, and to separate the bundles without slobbering. The device is very ingenious, and gives some promise of success.

Another effort deserves honorable mention—that of Dr. E. B. RICE, of Oregon, Wisconsin. This has not yet been made entirely automatic, but receives the grain from the revolving-apron of a MARSH harvester, and binds with a boy to assist it. The contrivance is admirable for its simplicity—any boy can work it, and any farmer can repair it if it should get out of order. The whole machine is made up of two or three pieces of iron and brass, somewhat as follows. Two half cylinders, some eighteen inches long and eight inches in diameter, being geared to the wheels, open and shut on hinges at one end. When they are opened the grain, enough to make a bundle, having been previously separated by a simple device, falls into the lower cylinder, which receives the butts. The upper half instantly closes on a flexible lining of spring steel, which, by the meeting of the two jaws in a perfect cylinder, enwraps the straw closely. Several hundred hempen bands

already noosed together are hung on a shaft near the hinge of the cylinder, and a boy slips one of these upon and over the closed cylinder, drawing it quickly upon the middle of the bundle beyond, by a twitch upon the pendant end, which buckles it tightly. The bundle is then released, as the jaws open to receive another. The bands cost, ready made, about a dollar an acre, Dr. RICE says, and they can evidently be used for several years. There is little doubt that this machine, with a boy to slip on the bands, will bind as fast as any reaper will cut.

The Horse-Rake was a great advance, and it has been so far improved as to seem now nearly perfect, with a seat for driver and a running-gear as light as a trotting buggy. Every farmer should have a good one, for it is a wonderful labor-saver, snatching hay from the coming shower, and performing, easily, the work of ten or fifteen men. It is impossible to say which of the hundred patents is the best. Revolving wood-rakes are yet used largely for their cheapness, and on small farms will continue to hold a place for some time as they are more easily repaired. On large farms the sulky independent wire-tooth rake is fast replacing all others. With it a boy and horse will rake and bunch twenty acres a day. The *bunching* is a great saving of hand labor, as with it the windrow is thrown in heaps or bunches of eighty to one hundred pounds, ready to be placed in cocks or loaded. The latter mode is now employed, as with this kind of rake the hay is very much compressed, and can be pitched nearly as well as from the cocks that have stood one or two days to settle.

The Hay-Tedder.—The horse-rake follows the tedder in the field, but the tedder followed the rake in the patent office. Indeed, it is doubtful if the principal features of the tedder are protected by patent; for thousands of tedders, somewhat similar to BULLARD's and the American, were hopping over English fields half a century ago. The tedder, like the rake, saves a million tons of hay every year, for it offers its aid at the season when weather is capricious, laborers are scarce, and work can not be postponed.

Without the mowing machine, the trouble in haying was to cut down the grass; with it, the trouble has been to take care of the hay. The horse-rake, until recently, has been the only available assistant for this purpose the

farmer has had, but the use of the tedder or dryer in connection with it will readily be perceived as necessary for accomplishing the work of getting the hay into a good condition for the barn or stack in the shortest time with the least expense. This shortening of the process of hay-making enables the farmer to cut his hay when it is nearest ready for the harvest, and much diminishes the risk of its injury from bad weather. The tedder, like the horse-rake, will soon be considered quite indispensable. The best made tedders aim to toss up the grass to the air and sun without too violent action, which after the heavy two-horse English machines was followed by a waste. But perhaps the greatest value of tedders, consists in the opportunity they give farmers to cut their grass when it is young, before it is seeded and spoiled.

The following incident which occurred at a Connecticut fair shows the marvelous efficiency of the horse-tedder: The operator took grass that had been mowed and had lain in the swath eight days, without six hours sunshine upon it during that time, and had been rained upon nearly every day; it was green, wet and sour. About two heaps of it was spread out in thickness of about four tons to the acre, the tedder passing over it every few minutes for about three hours. When he commenced operation it rained so that the farmers held umbrellas over their heads, and laughed at the operator for making hay when it rained. This was about noon; it soon stopped raining, and the wind sprung up a little, and at three o'clock that hay was dry enough to go into any barn, some of it blowing three rods while the machine was operating upon it. All this was done without a particle of sunshine.

The Horse-Fork.—The horse pitchfork deserves a more general adoption; and no farmer who has ever tried a good one at the stack or in field or barn, will ever return to the oppressive labor of lifting loads of hay, sweating at every pore, and filling his eyes and ears with hay-seed, on a sweltering August afternoon.

Every farmer who has ever pitched off from a wagon in one day ten or twelve tons of hay, is aware that no labor on the farm can be more fatiguing. The horse-fork, which, to a considerable extent, has been brought into use, has afforded great relief; this severe work not only being avoided, but much greater expedition attained. The effective force of a horse is at least five times as great as that of a stout man;

and if half an hour is usually required to unload from a wagon a ton of hay, then only six minutes would be required to accomplish the same result with horse power. Actual experiment very nearly accords with this estimate, three to seven minutes only being required by the assistance of the best horse-fork.

The method of unloading by horse power, is, usually, as follows: A tackle-block is affixed to the ridge-pole of the barn, and a snatch-block fastened to the sill in the door; the rope passes through each, a horse drawing away from the barn at one end, lifting to its place the hay on a fork at the other.

There are several good forks: GLADDING'S long-handled grappling-fork; BUCKNER'S grappling-fork; WALKER'S harpoon-fork, simply a straight spear that first enters the hay, then holds its burden by releasing a barb at its extremity; PALMER'S single cat claw-fork, excellent for all work; and SPROUT'S combined hay-fork-and-knife.

The latter manufactured by S. E. & L. B. SPROUT, of Muncy, Pennsylvania, is a very ingenious and a very effective implement. It is arranged like a pair of shears, with a long shaft, and with it a man can cut and lift out of a bay or stack, a solid bundle of hay two feet and a half deep, two and a half feet wide, and fifteen feet long, in two minutes and a half by the watch.

For pitching, it is only necessary to thrust the instrument in when shut, the sharp blade easily cutting its way down, the knife is opened, throwing the horns of the blades out and spreading the shanks apart; the braces are then sprung to hold it open, and it will take up half a ton of hay. When elevated to the desired place by a rope and pulley, a jerk at a cord bends the elbows of the braces, the fork or knife shuts, and the hay slips off. The whole implement weighs only ten pounds, and is of steel throughout.

For almost all kinds of work, SPROUT'S hay-knife-and-fork will be found the most satisfactory; though the harpoon-fork, manufactured by WHEELER, MELICH & Co., is preferred by some.

SPROUT'S fork, at the trial of implements held under the auspices of the New York State Agricultural Society, July 10, 1866, pitched off 1,810 pounds of hay over the large beam at five forkfuls, in two minutes and forty-five seconds. When pitching under the beam, the same fork removed 2,000 pounds of hay in one minute and forty-one seconds.

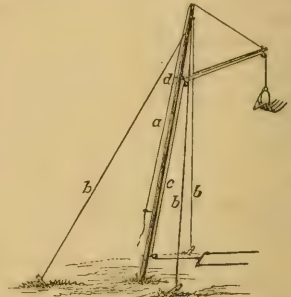
The judges say: "This fork enters the hay with great ease, and is tripped with celerity and certainty. It gathers a single pound of hay from the barn floor as easily as any hand hay-fork, and holds it more securely. It is one of the best hay-knives we have ever seen. As a hay-knife it will rapidly cut hay in the mow into solid blocks, and as a fork remove it to any place it may be desired. It is apparently indestructible, and will last a life-time."

Loading Hay by Machinery.—The editor of the *New England Farmer* thus describes a new machine, invented by N. B. DOUGLAS, of Cornwall, Vermont, the operation of which he witnessed in that place during the harvest of 1869: "To the valuable machines which I have named, there has recently been added another which I have taken especial pains to see in operation; it is for loading the hay by horse power, after it is sufficiently dry and thrown into windrow. I have seen it in use at three different times, and on uneven as well as even ground, and everywhere it did the work quickly and well. At one of my visits to see it, the first load was put on in eight minutes, the second in seven and a half minutes, and the third in seven minutes. This was done by the steady, usual working of the machine, and without any effort to do the work in a short time. The bystanders estimated the loads at 1,500 pounds each; the wagon, being a short one, would not conveniently take any more. The men using it stated that on a previous occasion they loaded and unloaded eighteen loads in six and a half hours, all the loads but the last one being placed upon stacks in the field.

"The loader is attached to the hind end of the wagon; stands perpendicularly; is eight feet long and four feet wide. It has eight sole-leather belts, each two inches wide, which pass over rollers at the top and a cylinder at the bottom. There are fifteen small iron spurs in each of these belts, which pick up the hay as the team, straddling the windrow, passes along, carrying it up and rattling it over upon the wagon. The whole of this weighs but one hundred and seventy-five pounds. It can be attached or removed in less than five minutes, and can be applied to any wagon. It makes no noise while being operated, adapts itself to uneven surfaces, and is exceedingly simple in every part of its construction. When I saw this small and light contrivance, noiselessly picking up the hay and conveying it to the wagon, I came to the conclusion that a device had been reached which would complete the

circle of machines to be used in securing the most important of all our crops—the hay harvest. Wherever a large amount of hay is to be secured, this machine must take rank with the mower, horse-rake, tedder, and horse pitch-fork."

Stacking Hay by Machinery.—Many farmers use a common derrick for stacking hay, made of three straddle poles, with a tackle-block rigged at top, through which runs the rope that lifts the horse-fork. A better device is represented by the accompanying cut: Get a stick



a, Arm Rope. b, b, b, Guy Ropes. c, Fork Rope.

say forty feet long, of some light timber, and dress it down so as to leave it strongest about fifteen feet from top. Take a light piece of timber twelve feet long (four by four pine) and hinge it with iron to the pole at d, so as to allow it to rise and lower or swing sidewise, fully two-thirds the way round, for an arm; run a five-eighths rope from the end of the arm to the top of pole, through a pulley made fast there, down the pole, and fasten it on a pin for the purpose of raising and lowering the arm from the ground. Fasten three guy ropes to the top of the pole and raise it, first digging a little hole a foot deep to keep the bottom of the pole in its place, and secure it by fastening ropes to stakes, one of which is driven directly behind the pole and the other two just far enough ahead to keep it from falling backward. The guy ropes should be sixty feet each. The pole should lean toward the stack, so that when the load comes on the crane, it swings of its own accord to the center. One of the fork-pulleys hangs on the end of the arm, one just under the arm on the pole, and one near the ground. This makes a better rigging in every way, and costs, forks, ropes and all, about \$25.

The advantages are: 1, A much larger rick

can be built, and the hay pushed to any part of it easily by the stackers; 2, all your hay is thrown in the middle of the rick, thereby preventing the settling of one side so as to lean the stack; 3, it is taken from the ground without dragging against the side of the stack. With such a crane, ricks of thirty or more tons are put up very easily.

The Threshing Machine.—This is one of the greatest of agricultural labor-savers; a blessing to farmers. It is not yet forty years since the jealous English peasantry arose and wantonly destroyed all the agricultural machinery of a neighborhood, in the mistaken opinion that its use was an infringement of their rights to labor; but this wild prejudice is now almost wholly disarmed, and every hand-worker is learning that an improved machine is his best friend, relieving him of drudgery and elevating his pursuit to dignity and independence.

The power threshing machine is of English birth, but as Americans borrowed the sickle and finger-bar, and made a McCORMICK reaper that was the champion of the world, so they have transplanted the thresher, and bettered it till they can outthresh their neighbors across the sea.

At the Paris Exhibition in 1855, PITT'S American machine bore off the prize. During the trial, to test the comparative value of the new way and the old, six men were employed to thresh with flails, and in one hour they threshed two bushels of wheat. During the same hour

PINET'S French machine	threshed	4½ bushels.
DUVOIR'S " "	" "	8 "
CLAYTON'S English " "	" "	13 "
PITT'S American " "	" "	24 "

Since the Paris trial, threshing machines have been vastly improved, until they seem to have reached the height of possible efficiency. Indeed, they may be pronounced perfect.

It was a long time before separators and winnowers were attached to the thresher; but when once put into operation, they soon became general, and now all machines have one or the other. In time straw-carriers and bagging apparatus were attached, leaving most of the labor to the team. At first farmers owned their own threshers; but now they mostly belong to jobbers, who go about threshing and cleaning grain at a certain price per bushel—say, for wheat and rye, five cents; barley, three cents; oats, two cents. The grain thus threshed is

ready for market, thus saving to the farmer the cost of a farm fanning-mill, and the labor of recleaning and screening, as was the case until within the last few years.

The farmer is at no outlay of capital for machines; all he has to do is to furnish half the team, which is two span of horses; a hand to throw the bundles from the stack; one to cut the bands and place them on the threshertable; one to look after the chaff and straw, and one to haul off the grain to the bin. The owner of the machine furnishes the driver, feeder, and one man to attend to the bagging and measuring.

The stacking of the straw was an important item, so as to save it for Winter feed. This is now done by straw-carriers attached to the cleaning apparatus, which deposits the straw on the stack. As the great mass of farmers on the prairies have no barns, this system of threshing has obvious advantages—but we trust its advantages will not prove so marked as to make any farmer satisfied to do without a barn longer than he is actually compelled to by the exigencies of his situation.

Farmers who have large barns generally own a different style of machine. These are called railway or tread-powers, and are adapted to one, two, or three horses. Some of these have only separators attached, so as to separate the straw from the chaff and grain. In this case, the threshing progresses according to the demand of the stock for the straw and chaff. Usually the machine is run a fourth or half a day at a time, according to the capacity of the floor to hold the straw. This mode of threshing, taking into view the value of the straw and chaff for feed, is, perhaps, one of the most economical that we have. The machine is cheap, and being always housed, will last a long time. In using this machine, the grain must be cleaned with a hand fanning-mill. With this there are two or three advantages—the work is done at a leisure time of the year, and the stock have the full benefit of the straw and chaff. The aggregate cost of threshing is below every other mode.

To these horse-powers and threshers a winnower and straw-carrier is sometimes attached, to do field or out-door work; and some large farmers use them for barn work. The farmer of two hundred acres, half of which he has in small grain, and who has a barn, will find this kind of thresher very profitable. The objection that formerly applied to these powers, in regard to the danger of injuring the team when

the band runs off the driving-pulley, is now obviated by the use of a patent brake that instantly stops the machine in such an event. The machines are portable, and can be taken out to the wood-shed or any part of the farm, and are the most commonly used to saw wood for railroads and for domestic use. They are also used for running hay or straw-cutters, for threshing and cleaning clover-seed, grinding corn, and other farm uses. They are among the most valuable and durable of farm machines; but let no man own one unless he has a barn, or other convenient place to house it. This remark also holds good for all farm machines and implements. The annual loss on farm wagons, machines, and implements by exposure to the weather, would nearly pay the whole tax levied on the farmers, both personal and real, in the country.

Power for the Farm.—In the last paragraph we have mentioned the horse-power; and a horse-power in some form, either working with the endless-chain, or the windlass, or sweep-power, is coming to be regarded as quite indispensable on every large farm, and it should be so located as to be geared to the thresher, the hay-cutter, the root-cutter, the corn-sheller, the lathe, the farm-mill, or the wood-saw. The sweep-power is built for one or two horses, and costs only half as much as the endless-chain power.

That intelligent observer of farm implements, S. EDWARDS TODD, says of the prejudice against railway or tread horse-powers: "The erroneous idea that such powers are 'horse killers,' does not meet with much favor among intelligent farmers. I used a span of horses on one of WHEELER's machines for more than ten years, and I know it never injured them any more than to travel on the ground. I have seen it stated in print that the use of such powers is as cruel as slavery. I am certain that the men who make such assertions are not the proper persons to give an opinion on such a subject, as I think they have never used such horse-powers for any considerable length of time."

Steam-Power.—We are ahead of our English cousins in the average efficiency of our farm machinery, but we are behind them in the use of steam as a motor. By them it is almost universally adopted for threshing, sawing, and much other farm work, while here it is used but little, scarcely at all, though it is doubtless as much more economical than horse-power, in this application of it, as it is in its application

to any other machinery. There are several excellent compact and portable engines manufactured, any of which farmers, who have plenty of wood or available peat fuel, would find profitable servants. Such an agent is adapted to almost as many kinds of service as a horse, and costs nothing for keeping except a little wood and water when actually at work. It can be harnessed to almost anything, and made to thresh grain, grind corn, saw the wood, and they now have it rigged on wheels so that it can run of errands—be sent to any part of the farm or neighborhood as readily as a wagon-load of anything else. Every neighborhood, at least, should have one of these iron horses to do the drudgery all around.

Windmills.—The powers of nature are sufficient to do all our drudgery, could we but fully subdue them and "have dominion over them." The gravitating power of water, the expansive power of steam, and the swift-winged lightning are already fulfilling their destiny in part, and the atmospheric currents which exceed them both in the vastness and universality of their force have been, for ages, the grand motive power of commerce.

There is not a day in the year when the powers of the wind, passing over a continent, is not vastly greater than all the muscular power of all its animated tribes. To bring this power successfully into the service of man on land, has been the most difficult problem of all that are conceded to be practicable. The use of windmills has long been known, having been brought from the arid plains of Asia by the Crusaders, yet their adaptation, as a motive-power, has remained extremely imperfect.

The difficulty has been to regulate the power, so as to get something like a uniform motion through the ever-varying velocity and power of the ærial current.

In some of the more recent wind-wheels, this objection has been largely overcome by an efficient governing apparatus, completely controlling the effect of the wind. This result is attained partially by the wings being so arranged, that as the speed increases they are turned more and more edgewise to the wind by governing balls, working on a similar principle to those attached to steam engines.

Their number is rapidly increasing on the Western prairies, where they are made available for threshing, fanning, hay-cutting, grinding, corn-shelling, wood-sawing, pumping, or other purposes. We have no doubt that this simple and universal force is capable of such

control as to render its use practicable to an extent heretofore unknown.

Hay and Fodder-Cutter.—As farmers become more enlightened, machines to cut fodder for their stock are more used. While there may yet remain a few who doubt the economy of steaming or cooking food for stock, all intelligent farmers now concede the profitability of cutting fodder—at any rate, of cutting all of a coarse quality. It is now generally acknowledged that *cattle will thrive on three-fourths as much cut hay as they will require if it be uncut*, and, if it be moistened, and a little salt and bran or meal added, the proportion will be still further reduced. Of course, this does not add nutriment, but it saves the secretion of saliva to an enormous extent, and relieves the animal of half the labor of chewing—thus performing a physiological function that is very manifest. In other words, *it saves animals exertion in feeding*, and so leaves them in better flesh. Mastication of long hay requires a considerable expenditure of muscular force. Besides, cut hay makes better manure.

Yet the middle way is the best even here. There is such a thing as cutting *too fine*—especially for the ruminating animals. Experience teaches that fodder digests much better after being macerated by the teeth of animals than when it is reduced so fine by a straw-cutter that the stock swallow it without first crushing it between their teeth.

When cornstalks are chaffed two inches in length a cow can masticate them with little difficulty, and there is no danger that the flinty portions will injure the animal; but when cut into very short pieces much more labor is required to do the chaffing, and the liability to injure the mouth by chewing the hard, flinty pieces of stalks is greatly increased. Short pieces of hard cornstalks that have been cut off square by a straw-cutter, often wound the gums of an animal so severely that it will endure severe hunger before it will eat fodder prepared in that manner. The stalks of Indian corn or sorghum should never be cut less than two inches long.

There is palpable profit in a good hay-cutter, for we can occupy the dreary days of Winter in cutting up fodder—straw, cornstalks, meadow hay—and so carry through our stock for twenty-five per cent. less than in the ordinary way. The cutter should be strong, simple, and durable; it should run easily, and the knives should be completely masked, so as to insure against

accident. There is a large and excellent variety in market, each of which, driven by horse or steam-power, is capable of cutting from one to two tons an hour.

Root-Cutters.—There are also admirable root-cutters, capable of cutting pumpkins, potatoes, turnips, beets, etc., fine enough for sheep, at the rate of two bushels a minute, if such speed were desired.

A Farm Corn-Mill.—We ought to have a better farm-mill to grind corn for stock, for far less food in this form will keep stock in a higher condition. On this point we quote Hon. M. L. DUNLAP, of Illinois: The cheapness of corn, which is the principal feed for animals, both for work and fattening, has generally been so low, and labor, on the other hand, so high, that little effort has been made in this direction. Most of the mills used for this purpose are of cast-iron, and are run by the use of a sweep. These, of course, only bruise the grain, and do not grind it so as to rupture the cells. There can be no doubt that there is economy in grinding corn and other grain for feed, when it can be done at a reasonable cost. To haul corn ten or fifteen miles, and pay one-fifth for toll is doubtful policy; and, to pay sixty dollars for a mill that will crush only thirty or forty bushels of corn in ten hours, with two span of horses, has no great promise of gain. If we could have a cheap mill to run with a railway two-horse power that would grind five bushels an hour, and at the same time not require a new set of grinders every other day, we might find it an advantage; but, of the hundreds of farm-mills that we have seen, not one of them comes within our idea of what such a mill ought and can be made to do. A durable mill of this kind would be cheap at a hundred dollars, and find a ready sale at the West.

Sorgho Machinery.—Mills to work up sorghum are now made strong and durable. Some of them have feed aprons and carriers to deposit the bagasse out of the way, when it can be hauled off for mulching or put in the manure pile. As a general thing farmers will do better to haul their sorghum to the steam works, rather than to work it up themselves; for, as a rule, farmers should not become manufacturers, as it will be found more profitable to give all such work into the hands of mechanics and skilled workmen than to attend to it themselves. The business of the farmer is to

produce and deliver the raw material into the hands of the manufacturer.

Among the best machines for this process are the Victor Cane Mill and Cook's Sugar Evaporator, made by BLYMYER, NORTON & Co., Cincinnati.

The Corn-Husking Machine.—

The machine before-mentioned, that is to work among the standing maize, is not yet in the market. But a successful corn-husking machine has been introduced, which seems destined to revolutionize present methods, by changing the tedious task of corn-husking into a rapid and attractive mechanical process.

Our enormous corn crop, amounting to nearly a thousand million bushels annually, is chiefly raised by the use of machinery. Manual labor only to a small extent is used in producing the crop up to the harvest time. Then commences the hand work. With large crops and costly labor, the corn-growers find it impossible to place the cereal in market at the most auspicious moment; much of the crop is, therefore, fed to stock, without husking, and immense quantities are wasted. The husks, too, are mostly lost, because, to preserve them, every husk must be grasped by the human hand. Yet the husk crop is one of the most valuable which we produce. It would amount, if saved, according to the estimate of some persons, to not less than eight million tons annually; and would bring, at fifteen dollars per ton, one hundred and twenty million dollars. In Austria the husks make paper superior to that made from linen rags. The largest paper-mills in the world—those near Vienna—employ nothing but husks, brought from Hungary, and costing forty dollars per ton, about the price of white rags in the Austrian market. From the long fiber of the husk excellent cloth is made; from the short fiber paper of superior quality is produced, while the gluten of the husk makes excellent bread.

The corn-husker which is now offered at seventy-five dollars, husks cleanly fifty bushels an hour, and strips off and saves every vestige of the husk.

The husker, at first sight, resembles a fodder-cutter. At one end of the frame which supports the machinery there are two rollers which revolve toward each other. The top roller is plain, made of hard wood, and some four or five inches in diameter. The lower roller is studded with stiff knives, set securely into the surface, so that if the two rollers are

screwed closely together they will cut the stalks into pieces about one and a half inches long. The stalks are fed between these rollers, but-ends first. When the but-ends of the ears arrive at the rollers, as they can not pass through, the knives cut or pinch off the stem, when most of the husks pass through with the bruised stalks, and the ear drops down on two small rollers, about two inches in diameter, which are set at an inclination endways, so that the ears, in slipping along in the depression made by the two rollers, have all the husks and silk stripped off them by the two rollers beneath the ear of grain. A small shaft, with small sharp spikes in it, causes the ears to revolve as they slide along, so that every side of the ear is presented to the rollers, when in motion, which seize every husk and all the silk, and strip them off as neatly as can be done by hand and with great rapidity. One horse will drive the machine to husk as fast as one man can place the stalks on the feeding-box.

A point of transcendent excellence of this husker is, it will strip the husks from large ears and small ones with equal facility and neatness, without any alteration of the machinery.

When the stalks have been run through this machine, the large ones are crushed so that the moisture will escape in a few days, and in much less time than would be required to dry out and cure whole stocks. The man, therefore, who husks corn with such a husker, will be able to dry and cure his crop of cornstalks in a few days, and thus save a vast amount of excellent fodder which must be lost in curing if the large stocks are not crushed so as to allow the moisture to escape readily. It is the large amount of sap in the big joints and pith of the cornstalks that causes the stalks to heat and mold after they have been secured in a stack or mow.

Pulling Out Stumps.—Stump machines are now made so effective and convenient, that two men and a team can take out almost any stump in a few minutes with but little effort. For certain kinds of work, the sweep-stump machines are perhaps the cheapest and best. For taking out large stumps and rocks, the lifting-machine will be found the most convenient and the cheapest.

With a stump machine of the latest improvement, a man and a boy, with a horse, can take out from fifty to one hundred large stumps in a day, without expending one-half the strength

that would necessarily be exerted by a faithful laborer in doing one-tenth of the work, with a grubbing-hoe. Grubbing out small stumps is the most expensive way they can be removed. Small roots should be taken out with a cheap hand machine, which two men can readily handle.

H. M. ROGERS, of Kenosha, Wisconsin, describes his stump machine, which has the treble merit of being effective, cheap, and not patented. Mr. ROGERS says: "I bought two screw-jacks, and I had a stout log chain. These jacks have $1\frac{1}{2}$ feet lift, working in cast-iron pedestals. I procured a stout beam, eight feet long, and about as heavy as two men would want to carry, and two pieces of plank for the jacks to stand on, together with some blocks, etc., and all was ready. I place the beam

and all ungathered. The next advance consisted of two light plows attached to elevated side pieces, upon each side of the machine, to run before, clear away weeds and loose dirt and expose the row of hills to the digger, which followed after. The digger was a shaft of iron, nearly flat upon the bottom, with a slight depression in the center. The soil and potatoes were carried over the shaft together, and thrown upon wire-rake fingers behind, by which the potatoes were separated from the dirt and left upon the surface of the ground.

Since this crude effort, further improvements have been added, by which all the potatoes are separated from the soil, and deposited in a box capable of holding from ten to fifteen bushels, entirely free from dirt and ready for the bin. It is claimed that a man with two horses may gather six acres a day—as many as the best horse-planters will deposit in the soil. ASPINWALL'S digger, manufactured by WHEELER, MELICK & Co., Albany, is said to perform satisfactorily the work of twenty men.



ROGERS' UNPATENTED STUMP-PULLER.

across the largest and stoutest root of the stump, one jack on each side, and as near the stump as I think the roots will allow, and resting on a piece of plank. The chain is passed around the root and the beam. One man at each jack will raise almost any stump to the full lift of the screw, which, in a majority of cases, is sufficient; if not, place a stud under each end of the beam; let down the jacks, and placing blocks under them, give the stump another lift. Two men will pull from thirty to fifty stumps a day, and the machine will cost fifteen or twenty dollars, while the jacks are useful for many purposes besides pulling stumps."

Potato-Digger.—If TRUE'S, or SPAULDING'S, or any other potato-planter, will cut, drop, and cover six acres a day, and save the labor of ten men, as claimed, an equally effective machine to harvest the crop becomes quite imperative. There is no doubt that the expensive and back-aching work of digging and picking up potatoes will soon be done by horse-power.

The first horse-diggers were merely the old double-mold-board plows, with projecting fingers behind to retain the tubers, and drop them upon the soil. This was, perhaps, better than a potato-hook, but it left some covered,

Cow-Milking Machine.—There have been several cow-milkers made, and brought into use to a small extent. The simplest is the Mexican cow-milker, consisting of a hollow iron tube some two inches long, but smaller than a goose-quill, which inserted into the channel of the teat brings all the milk away without pressure of any kind, and without irritation or harm.

OLON ROBINSON thus describes a milker which has been advantageously used by some farmers: "It consists of two diaphragm pumps made of tin and India rubber, so adjusted as to be easily taken apart for washing. The teat-cups are made tapering to fit any size. This machine is attached to a pail and set on a stool under the udder, the four teats inserted in four tubes, and the pump operated and the milk drawn and conveyed by a conductor into a pail, the inventor says, in a marvelously short time—say three minutes for an ordinary cow; milking entirely clean without injury and to her advantage."

Wine and Cider Press.—Much attention is now being directed to the cultivation of small fruits, and many people feel the need of a cheap, efficient, convenient, and portable mill with which they can make a gallon of cider or wine, or larger quantities if desirable. There are several kinds that operate satisfactorily; but the little portable HUTCHINSON mill,

manufactured by the Peekskill Plow Works, Peekskill, New York, and by GEORGE E. HUTCHINSON, Cleveland, Ohio, stands, perhaps, at the head of the list, when everything is taken into consideration. This mill will grind apples, pears, and grapes without crushing the seeds, which is an important point when making cider or wine. It will also grind all kinds of berries and cherries, and crush the pits without injuring the grinding apparatus.

Apples are first crushed, then ground into a fine pomace, which is discharged directly into the curb or into a pail. The grinding may be done by hand or by horse-power. The pressing is done by hand. The teeth of the grinder are so arranged that no apples can clog between them. One man can grind several bushels of apples per hour, and make several gallons of any kind of wine per hour. This machine can be employed as an excellent lard press; and it is frequently employed in the dairy for pressing cheese.

There may be better mills than this, but we have not met with any that possesses so much, compactness, convenience, durability, and efficiency. The crowning consideration is its cheapness, which is about twenty-two dollars for the small size.

Churn.—We have already intimated that there is nothing much better than the old dash churn, with some improvements. A churn of this kind, which has been awarded the first premium by the New York State Agricultural Society, and is a favorite throughout the large dairy districts of that State, is the WESTCOTT churn, made by the Seneca Falls Churn Manufacturing Co., New York. It embraces the principle of the old dash churn, but adds thereto certain improvements, intended to secure the best quality and largest quantity of butter with the least labor. For these purposes the dasher is double—the upper one adjustable so as to be placed at the top of the milk when the lower one is about half-way between bottom and top. The dasher is worked by a lever, so that the motion is like that of a pump handle, and a steel spring raises it to the surface of the cream, thus relieving the operator of the most laborious part of churning. By the peculiar shape of the upper (adjustable) dasher, air is carried to the bottom of the churn at every stroke. All parts of the churn with which the cream comes in contact are of the best white oak.

A Dumping Wagon.—A very convenient manure wagon was lately introduced—just the thing that many want: "The body is in four sections or boxes resting on axles or rollers, which are supported on two sills at the sides, by which the wagon is drawn, thus obviating the necessity of a reach, and allowing the boxes or sections to dump separately. Any boy of sufficient capacity to manage a team, can unload one in less than two minutes, leaving the load in four separate heaps, without any tool or handling of the manure. The boxes are very easily removed when rails, hay, etc., are to form the load."

Sheep-Shearing Machines are considerably used in some sections, and the best have disappointed public expectation by working very satisfactorily and very rapidly. The apparatus is a box, about the size and something of the shape of a common brick. It is fastened to the arm of the shearer, who works the cutting part by moving a lever with his hand so as to produce a rapid oscillating motion of the knives. The knives are shielded by guards, similar in principle to those which are used for mowing machines, and although they can be made to cut very close, it is impossible for them to cut the skin. The machine works more rapidly than the shears, and cuts very evenly.

Other Improved Implements.—It is scarcely possible that agricultural machinery will make such progress during the next twenty years as during the last twenty; for in 1850, this field of invention was almost entirely new and unoccupied. Yet there are some labor-savers, which our Western prairies stand sorely in need of, and which the next decade will almost certainly produce; and any large farmer will confirm our judgment that the most prominent of these are: 1, An automatic grain-binder, geared to a reaper; 2, an improved soil-stirrer, that shall prove far more effective than the common plow, or even than the lightest and best of the steel plows. That both these implements will be furnished, is foreshadowed by what ingenuity has already achieved in behalf of agriculture.

Our pages do not afford room for a notice of the ditching-machine, clod-crusher, dirt-scraper, corn-sheller, hay and cotton press, clover-huller, and many other important implements; we can only advise the reader, who de-

sires to know of these, and learn more of the details of such as we have mentioned, to send for an illustrated catalogue, to some prominent manufacturer and dealer, whose advertisements are to be, or should be, found in the agricultural journals.

Minor Matters.—There are some facts and hints connected with the implements of the farm and household, which may not be deemed unimportant.

A Corn-Marker.—An excellent corn-marker, for four rows, is made by putting the forward wheels of a wagon upon a short axle—say four feet—and the hind wheels upon a long axle—say twelve feet—then connecting the axles by a six-foot reach, and adding the wagon tongue. Sixty acres in a day can be marked with it. It runs light, and makes a good mark, and one that will show after a rain as plainly as a sled mark.

A Portable Water Barrel.—On almost every farm there is usually a large quantity of water to be transported from place to place, which may be greatly facilitated by simply hanging a water barrel between two light wheels. A pair of the forward wheels of a light carriage would be just what is needed. A strong cider, beer, or oil barrel may be used, by cutting two square holes through the staves about two-thirds of the way up, to receive the axle-tree, which should fit close to the orifices, and be secured with nails, having the very small cracks stopped with pitch, or beeswax and tallow. In many instances a farmer could carry one or two barrels of drinking water a short distance, to a few animals much sooner than they could be driven to the watering place. As the piggery should always stand at a good distance from the dwelling-house, a swill barrel, on wheels, would always be found eminently convenient for carrying all kinds of swill, whether in a solid or liquid state, to the swine's trough. Such a barrel may be appropriated to numerous purposes which will suggest themselves. A lid is made to fit the top closely; and two hooks hold it down, so that but little of the contents of the barrel can escape even were it turned on the side.

To Keep Tires on Wheels.—Hear what a practical man says on this subject: "I ironed a wagon some years ago for my own use, and, before putting on the tires, I filled the felloes with linseed oil; and the tires have worn out and never were loose. I also ironed a buggy

for my own use seven years ago, and the tires are as tight as when put on. My method of filling the felloes with oil is as follows: I use a long cast-iron oil-heater, made for the purpose. The oil is brought to a boiling heat, the wheel is placed on a stick so as to hang in the oil, each felloe an hour for a common-sized one. The timber should be dry, as green timber will not take oil. Care should be taken that the oil does not get hotter than boiling heat, in order that the timber be not burnt. Timber filled with oil is not permeable to water, and is more durable. I was amused, some years ago, when I told a blacksmith how to keep the tires tight on wheels, by his telling me that it was a profitable business to tighten tires; and the wagon-maker will say that it is profitable to him to repair wheels. But what will the farmer say who supports them both?"

How to Hang an Ax.—A tool that is used so much as an ax should be properly adjusted, as every blow will tell of the ease or awkwardness of the hanging. The rule is very simple. Put the helve loosely into the ax at first, so that it can be moved to the proper position; now let the center of the edge of the blade of the ax, and the butt of the helve (or part taken hold of), be brought each down to a horizontal line, which may be done by simply placing them on the floor, and the ax is ready for wedging.

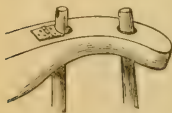
Filling Ice-Houses.—A good deal of labor is sometimes lost by not adopting the easiest mode of lifting the ice out of the water. After the blocks are sawn in the water (which should be done by accurate measurement, so that all may pile up solid, like hewn stone, and leave no crevices), they are very easily and quickly drawn out by means of a light, stiff plank, having a cleat across one end. This plank is thrust with its cleat end into the water, and under the block of ice; the cleat holds it, when the plank is drawn forward, and thus lifts it out.

Razor Strops.—Oxide of tin, as many know, has a fine sharpening quality, and is extensively used for coating the leather of strops. When they have lost their efficiency, rub them briskly for a short time across a tin vessel, and enough will be imparted for the intended purpose.

Marking Bags.—This is easily done by applying black paint with a brush through holes cut as letters, in a piece of pasteboard. But the pasteboard, unless inconveniently thick, curls

at the corners after a time, and the letters are defaced. Tin plate is much better, but it is difficult to cut the letters in it. Thick *sheet-lead* is, however, just the thing, and any person who can use a knife may cut the letters through it after they have been accurately marked.

An Ox-Bow Fastener.—An excellent substitute for a bow-pin is represented in the accompanying cut. A common butt or small hinge is used for this purpose, and is screwed by one wing on to the top of the yoke, so that its movable



able wing may cover about one-fourth or one-fifth of the hole. A notch is cut into the bow to correspond with this projecting edge of the hinge. On inserting the bow, this half of the hinge is thrust upward, but drops and secures it as soon as it reaches the notch.

Tinkering.—A gun will not need cleaning for years, if the muzzle is kept tightly corked, and a piece of rubber kept upon the tube under the hammer, while standing idle.

The sharp corner of a common Indian arrow-head, or flint, will cut glass quite effectually.

For wheel-grease, take two parts hog's lard, by bulk, and one each of black lead and wheat flour. We have heard wagons a mile off, on a still morning, uttering the most dismal sounds from the want of a little of this material, and which a very little imagination translated into words—"meeze-e-ry, meeze-e-ry, meeze-e-ry!"

When you cut India rubber, keep the blade of your knife wet, and you can then cut it without difficulty.

Every farmer ought to know that cut nails, heated red-hot, and dropped into cold water, will clinch as well as wrought nails.

The *Scientific American* says that animal fats are much better than vegetable oil for all kinds of agricultural machinery.

Household Implements.—Invention is relieving domestic drudgery almost as much as it modifies the toil of the field. The Yankee baby sets itself seriously at work to improve its nursing-bottle, and devise a more convenient cradle. And its ingenuity is prolific of results. The loom and spinning-wheel are now things of tradition—standing like skeletons of Silurian monsters in the background of the ancient kitchen. Before the

spirit of Ingenuity we are becoming terribly practical, and our household and neighborhood amusements are passing away.

Once we had the sewing-circle and the quilting-bee, but both are scattered now; the omnivorous sewing-machine devours cloth and thread to come forth garments; and across the patchwork-quilt a girl pushes rapidly back and forth a toy-cart of glittering steel, and the quilting is done! We had the apple-bee, where pleasant faces chatted across busy hands, and the necessary initials always came forth at command from the coil of apple-parings; but now a machine is advertised where the apples are poured into a huge hopper to re-appear flayed, cored, and quartered, ready for pies!

The knitting-needle and darning-needle will soon have to retire from business, and the old lady knitting in the corner will live only on the artist's canvass; for the new knitting-machines will produce a web either tubular or flat, single, double, or ribbed, finishing a stocking from top to toe in fifteen minutes, and turning off twenty or thirty pairs a day. Then there is the carpet-sweeper, the washing-machine, and clothes-wringer, the "lightning meat-chopper," and innumerable other agencies of relief. Even the baby born behind "brown-stone fronts" is rocked by clock-work!

All this is well, and foreshadows a better time. Invention is the mother of Opportunity. The opportunity may not always be well improved; the thriftless, sluggish, dissolute man, the frivolous, thoughtless woman, may waste or misuse it; but in the aggregate, the hours that are saved from the earthly struggle for food and clothing, go to promote the intelligence, comfort, and well-being of our race.

In the whole domain of industry, the truth is now placed beyond controversy that machinery has proved the best friend of the workman. It has immensely increased both the number of the employed and the rate of their remuneration. Every wheel and lever, every cog and shaft and belt that takes the place of a human hand, adds to the aggregate not only of national wealth but of human comfort.

The natural effect of this substitution of mechanical for muscular power in agriculture is to make husbandry a less precarious and a more scientific and lucrative pursuit. It tends to transfer human labor from the ruder processes which can be better performed by machinery, to the more refined operations which

demand the intelligence of the human mind, and the dexterity of human fingers. Machinery can dig and reap, and weave and sew, but is still indispensable. The mower, the binder, the thrasher, the steam plow will demand their direction a better instructed, a quicker-witted, and a better paid class of laborers than existed in our fathers time. No machinery supersedes human toil; but only transfers it to a higher plane. Invention is the handmaid of general enlightenment, and the progress of knowledge is the emancipation of labor.

FARM ECONOMY:

PRACTICAL DIRECTIONS AND USEFUL TABLES.

UNDER this head, we shall group many interesting and valuable facts and suggestions relative to the management of a farm, that have not seemed to find place, naturally, in the special departments of this work.

To make Farming more Attractive.—We have already treated this matter in our first chapter, but its varied lessons can not be too earnestly enforced:

1. By better implements. Labor-saving machinery is doing more to make farming popular than all other influences combined.

2. By less hard work. Farmers often undertake more than they can do well, and consequently work too early and too late.

3. By more system. Farmers should have a time to be in, and stop labor. They should put more mind and machinery into their work. They should theorize as well as practice, and let both go together. Farming is healthy, moral, and respectable; and, in the long run, may be made profitable. The farmer should keep good stock, and keep out of debt. The farm is the best place to begin and to end our days, and hence so many in the cities and professional life covet a rural home.

4. By taking care of health. Farmers have a wholesome variety of exercise, but too often neglect cleanliness, omit bathing, eat irregularly and hurriedly, sleep in ill-ventilated apartments, and expose themselves to cold. Nine-tenths of the human diseases arise from cold or intemperance. Frequent bathing is profitable; so is fresh air, deliberation, and cheerfulness at the dinner-table, and rest after a meal.

5. By adorning the home. Nothing is lost by a pleasant home. Books, papers, pictures, music, and reading, should all be brought to bear upon the in-door family entertainments. and neatness, comfort, order, shrubbery, flowers, and fruits should harmonize all without.

Home should be a sanctuary so happy and holy that children will love it, women delight in it, manhood crave it, and old age enjoy it. There would be less desertion of old homesteads, if pains were taken to make them agreeable. Ease, order, health, and beauty are compatible with farm life, and were ordained to go with it.

When to Buy a Farm.—All know that cultivated fields show to the best advantage in Summer time; yet few seem to realize that July and August are the best months in the year in which to select a farm. At this season one can judge, without chemical analysis, whether the land can produce good crops, for if it be covered with waving grass or grain, and if there is "an abundance of choice fruit," the ocular demonstration will be accepted as a sufficient voucher.

Book Farmers.—The man who sneers at "book farming" and derides the idea that agricultural journals can throw light upon his labors, will never attain to eminence in his occupation. He may, by stinginess and hard knocks, manage to feed his family without a farm-book or paper; but they are quite indispensable to rapid progress.

SAMUEL WILLIAMS, of Waterloo, New York, says: "I know a farmer who has paid over three hundred dollars for a private library, and who takes both the *Albany Cultivator* and *Genesee Farmer*. In proof that he is something more than a theoretical farmer, he sold the surplus products of his farm last year for over fourteen hundred dollars, and he paid out of the same but ninety dollars for hired help—he has no children old enough to work in the field. It is hardly necessary to say that he is fully up to the improvements of the age."

MILTON J. ROSS, of Allen county, Ohio, says, in the *Ohio Cultivator*: "This year I had

twenty bushels of wheat to the acre, from a field of forty acres—which for this region is a remarkable crop—and I attribute the extra yield *entirely to knowledge I have obtained by reading.* When I commenced farming, twelve years ago, my wheat crop was only six to eight bushels per acre.” * * * “Mr. BUEL, in his life-time, furnished me information, through his ‘*Cultivator*,’ in relation to making and using manures, that is worth to me, at least *five hundred dollars.*”

How many hundreds of thousands of dollars have been saved and earned, in all the Middle States by information obtained through MOORE'S *Rural New Yorker* and the *Agriculturist*!—and how many fortunes in the West has the *Prairie Farmer* been the key to! Says HORACE GREELEY: “There are at present some fifty or sixty periodicals published in our country devoted to farming—as many, I presume, as in all the world beside. They have been built up at a great expense of talent, labor, and money; for when Colonel SKINNER started the first of them at Baltimore, some forty years ago, the idea of teaching farmers anything in *that* way was hooted by them as ridiculous, and he found it hardly possible to give his early numbers away. Hundreds of thousands of dollars have been spent in these publications; and they are this day, in my judgment, doing more to promote the true growth of the country, and the substantial, enduring welfare of our people, than Congress and the army and navy, for the support of which they are taxed some forty millions per annum.”

PENNOCK PURSEY, of St. Paul, Minnesota, gives in the *Chicago Post*, an account of the experience of OLIVER DALRYMPLE and others who have followed farming on a large scale for a few years past, in that State, adding some remarks to the effect that farming, with the same amount of capital, study, energy, and business sagacity that other kinds of business employ, can be made to pay as well as the best, and to rank with the highest in point of respectability, agreeableness, and certainty of profits.

Mr. DALRYMPLE does not scorn “book farming,” but eagerly makes himself familiar with the best methods, deduced from the aggregate experience of others, and the result is, that though a lawyer by profession, he makes farming pay munificently. In 1867, he grew seven hundred acres of wheat, averaging twenty-one bushels to the acre, or a total of thirty-five thousand seven hundred bushels. He contracted for the transportation of his crop in bulk to Milwaukee, for twenty-one cents per

bushel, where he realized from \$1 60 to \$1 85 per bushel, netting about \$1 50 per bushel, or an aggregate of \$53,550. In consequence of the extremely high prices which had ruled the preceding year—seed-wheat costing \$2 50 per bushel, with corresponding disbursements for first breaking and other expenses—the net profits were somewhat less than one-third of the total receipts; but a clear profit was realized of about \$14,500.

In 1868, his crop averaged twenty-three bushels per acre, aggregating thirty-nine thousand bushels, and leaving him, when sold, a net profit of more than \$20,000. His crop for 1869 was nearly fifty thousand bushels. Many other farmers in other States bear equally eloquent testimony to the value of “book farming.”

Does Farming Pay?—Almost every man thinks he can drive a four-horse team, manage a farm, and keep a hotel, without any special training for either job. This idea that farming is an occupation that requires no education and little skill, lies at the basis of most of the failures to make farming pay. No other profession could stand so much mismanagement and so much stupid and mulish conservatism as agriculture has had to sustain.

Yet, in spite of the ignorant and thriftless thousands who drift into farming on the theory that “anybody can manage a farm,” it is more profitable than any other occupation. There are thousands of men in this country who have made \$50,000 a piece from farming alone. If it were, as some assert, a bad business, three-fourths of our population would not select it, or remain in it as a matter of choice, while commerce and the mechanic arts are open to all. No man voluntarily chooses, as his portion, hard labor, poverty, and misery. Trade, like water, finds its level. If any occupation or scheme happens to prove very lucrative, great numbers rush into it, and it is soon overdone. If, on the contrary, it is found a losing business, a portion withdraw, and leave a better field for the rest. And now, after the lapse of thousands of years, we find the great majority of all active men adhering to agriculture as the occupation of their choice.

AMOS LAWRENCE, of Boston, kept a record during a long life, of all his mercantile acquaintance, and found that out of every hundred who entered business, ninety-seven failed of success. J. J. THOMAS asserts that “a thousand young men who engage in the cultivation of

the soil, accumulate a larger *aggregate* property than a thousand who enter trade." Farmers who attend to their business, exercise decent economy, use common judgment, and let outside speculations alone, do not fail. Moreover, their prospects are every year improving in every State.

Our farmers make more money than their fathers did, and spend more; they live better, dress better, travel more, read more, live in better houses, educate their children better, and are in every way more prosperous. If a census could be taken of the merchants and business men in our large cities who are most active in their occupations, and the most noted for wealth and enterprise, it would be found that a majority of them came from a farm, and a very large proportion of them look forward to a home upon a farm, to which they may sometime retire from the avocations of commerce, as the goal of their ambition. Comparatively few ever reach it and they only after the habits of a life-time have unfitted them for its enjoyment.

How to Make it Pay Better.—

The first advantage a young man can have as a farmer, is to work for his farm and pay for it with money earned with his own hands. To inherit a farm will probably diminish success; to inherit \$10,000 in addition, will probably prevent success. "Young man!" says Dr. HOLLAND, "if you are poor, thank God and take courage, for He has given you a chance to make somebody of yourself!" The doctor is right; if you are plucky, a good kick out of doors is better than four rich uncles.

Study.—Study this and other books and journals of agriculture, select such methods of treatment of soils, crops, orchards, etc., as seem fitted to your farm, and then test their value and adaptation by careful experiment. You will be better for your books; don't neglect them. Learning is wealth to the poor, honor to the rich, aid to the young, entertainment and comfort to the aged.

Mixed Farming.—Practice a diversified or "mixed" husbandry; having one *leading* department, as hay, grain, stock, fruit, or the dairy, but seldom adopting any one to the entire exclusion of all the rest. The different departments work economically together and assist and strengthen each other, while constantly improving the soil. Those farmers in the West who make wheat-growing or stock-fattening their entire reliance, are following a haz-

ardous course which is likely to end in complete or partial ruin.

Draining.—No other improvement is so much neglected on American farms as subsoil or tile-draining, and no other would yield such an immense profit as this, if it were judiciously introduced in every settled township. There are thousands of farms that would double in value in five years, if they were subjected to a thorough system of tile-drainage on every field that suffers for lack of it. If the land is wet, swampy, or springy, of course it should be drained, but there are many apparently dry fields that equally need relief from stagnant water held in the subsoil. This condition may be easily determined by digging a hole two feet deep in the Spring of the year; if water will stand in it, underdraining is required.

If one of our railroads or banks should be known to pay an average of *thirty per cent.* dividend annually on its regular earnings, what a rush would be made for the stock at par! Systematic tile-draining will almost always pay as much as this, yet farmers are as sluggish as the dead water, and do not invest! We entreat every reader of this paragraph, who holds land worth forty dollars an acre, to *try tile-draining on a single field*. It will plead its own cause thereafter.

Akin to draining, and equally advantageous in many sections, is

Irrigation.—This is practiced little in the States; but Utah offsets its peculiar marital theories by an excellent example in the matter of irrigation. For a knowledge of the benefits of watering, we already owe much to the Mormons. A correspondent says:

"The report of the Deseret Agricultural and Manufacturing Society, made last year to the legislature, shows this: The amount reported as having been expended for irrigation in one year was \$246,938, and the number of acres irrigated was 93,799. Eighty thousand five hundred and eighteen acres were devoted to cereals; one thousand eight hundred and seventeen to sorghum; six thousand eight hundred and thirty-nine to root crops; one hundred and sixty-six acres were planted with cotton; and twenty-nine thousand eight hundred and seventy-six were reported as meadows. There were nine hundred and six acres in apple orchards; ten hundred and eleven acres in peach orchards; seventy-five acres in grapes, and one hundred and ninety-five acres in currants. A canal is in course of construction, by a stock company, to bring the waters of Utah Lake

along the whole length of the intermediate valley to Salt Lake. This will afford means of irrigation and hydraulic power to run mills."

Thoroughness.—No farmer ought to be satisfied with less than an average of two tons of hay to an acre from his meadows, and his stock ought to reap as much from his pastures. This may easily be attained by underdraining, deep plowing for previous crops, and heavy seeding to grass. We have known an average of four tons to the acre, from fields thus managed.

It is a fact that our most successful farmers are, as a rule, gentlemen who have been engaged in active town or city life, where much thought, energy, activity, and enterprise are required; they have been taught system, order, prudence, and economy in the adaptation of means to ends—to do everything well, and to do it at the proper time. They have learned not to spurn any agency that will increase their knowledge of their new occupation and point the road to success.

There is a very pretty fable of a Sicilian peasant that had three daughters. When the eldest was married he gave her one-fourth of his vineyard, and his annual crop after that was the same. When his second daughter married, he gave her one-fourth, and still his remaining vines bore the same quantity of clusters as before. When the third daughter married and received her equal portion, his harvest was as large as ever. The secret lay in the fact that he bestowed on one-fourth part the same skill and labor formerly expended on the whole vineyard, and with the same result.

Perhaps we can best indicate how to make farming pay better, by showing

How to Lose Money by it.—If you are a young man, bend all your energies to the procuring of a fast horse, and show your activity by cutting a swell behind him around the country. Wait patiently till "the old man" dies and bequeaths to you his farm, then hire BILL SMITH to take care of it, instructing him to use his own judgment and not bother you. Encourage the raising of live stock by attending horse-races, and patronize breeders by staking your money on the result. Connect yourself with the agricultural press, by subscribing for the *Field, Turf, and So-Forth*. Show your interest in the growth of rye, barley, and hops, by drinking freely of the beverages therefrom concocted. Give your countenance in the same way to tobacco culture. Don't get married; you can't afford that sort of husbandry.

In about four years, if the farm is a good one and you are as frugal as you will be likely to be, BILL SMITH, or a more enterprising neighbor, will foreclose sundry mortgages, take your property off your hands, you can go to sea to complain of your "bad luck," and wonder what has become of your money.

If you are an old hand at it, and still manage to keep a little farm going on slipshod principles, the following rules will enable you to do all your work uniformly—in the worst possible manner:

Concerning Land.—If you add to your acres, buy poor land at a low price, rather than the best at a high price; you will thus get something like half as much harvest for your subsequent labor.

Never drain; if you do, the farm-work will be hastened, crops increased, and manure saved, besides which you will lose the stagnant water and the "buried crockery."

Plow shallow; keep doing as your grandfather did, and stick to it that "yaller earth is pizen."

Concerning Manure.—Build your hog-pen, and if possible, your barn-yard, across a running stream; this will carry the filth off your farm, and you won't be bothered with it. Some of the best farms are "always stuck up with manure."

If there is no running stream convenient, move your barn, when the yard is packed six or eight feet deep, to another hill-side, and start again; the original deposit will wash away in time. By this flanking system do thousands of sagacious farmers in the West get rid of a nuisance, and, at the same time, preserve that cleanliness which is said to be "next to godliness." Give a neighbor the contents of your privy, and pay him to carry it upon his own land.

If, after the above treatment, your soil yields any crops, never feed or plow under the wheat-straw and cornstalks, but always burn them—you won't be troubled with so heavy a growth next time.

Concerning Crops.—Plant the same crop year after year in the same field, thus diminishing the product, and filling the land with weeds.

Plant and sow very late; by so doing you will diminish the crop an amount equal to the whole net profit; that is, you will get nothing for your labor.

Allow your corn-fields to be filled with a dense undergrowth of weeds, and potatoes, turnips, and onions with a dense overgrowth of

ditto; it won't cost half so much to harvest your crop, and money paid out in August and September is an important item.

Don't be persuaded to sow clover and then waste it by plowing it under; if you do, it will pulverize, warm, and enrich the soil, and the first you will know, your harvest will be larger than you will know what to do with.

Don't be fooled by the cry of "rotation." Dirt is dirt, isn't it? and if a field will grow potatoes, of course it will grow wheat. Keep your corn in the "corn-lot" all your life, as your father did; if you were to jump around from field to field, as the book-farmers advise, your corn would very likely outgrow the granary—and then what a fix you'd be in!

Concerning Stock.—See how little food will keep a cow alive. It is astonishing how this sort of economy counts up!

Feed as irregularly as possible. It will give the cows an appetite if they wait an hour or two for breakfast; and it will save them anxiety if they don't know precisely when to expect it.

Wouldn't waste many oats on horses; how do horses get along in countries where oats won't grow? Oats make horses frisky; get them used to going without, and they will be just as well satisfied with gnawing the wood-pile or the fence.

Don't throw corn to pigs; *men* can eat corn, and there has been enough wasted in hog-troughs to keep thousands of human beings from starvation; above all, never feed pigs till they stop squealing. It is bad manners to squeal, and well-bred swine ought to be broken of it.

Let neat cattle, so called, lie in their own manure as much as possible, for it will keep them warm. Never curry them—it makes 'em tender.

Teach your cattle to jump; it won't cost you half so much to feed them, and if it costs your neighbors more, that is their lookout. Cattle may be taught to go over any fence, by careful training, as follows: First starve them, or give them poor feed, which will make them light and enterprising. As soon as they go over the lowest part of the fence after better provender, put on another rail and then make them jump back again, saying "Plague take you! I guess that'll keep you out!" Next day, drive them out again, repeating the process, and adding another rail. In a short time they will be able to take care of themselves.

Cattle will live with very little care. Stables and sheds are an expensive and needless luxury.

You will be surprised to see how much exposure to snow-storms cattle can stand when they are once hardened. When Winter sets in turn them to the hay-stacks, pull down the fences and make them earn their own living. In the Spring you will have land-pike pigs, hump-backed cows, and horses of Gothic architecture, with appetites as sharp as their hips. Don't fail to teach your stock self-reliance.

By a careful observance of the above rules, the farmer may dispense with keeping an account of annual profits and losses.

Lucky Farmers.—Say what we will there is a good deal in luck. There have been some very unlucky farmers who were frugal, industrious, and had no expensive personal habits.

One man was unlucky in wintering his stock. He kept, generally, about twenty cattle and a hundred sheep, and wintered them mainly in the yard and fields. The cattle trod about three tons of hay under foot each year, and consumed half a ton each extra by exposure to the winds, in all thirteen tons, worth ninety-one dollars. This exposure of cattle and calves reduced their size and market value one-third—annual increase, six head, and average value lost, eight dollars each—forty-eight dollars. Ten per cent. of his sheep and lambs, were lost for want of shelter, and the clip was diminished twenty-five per cent. from the same cause—total loss on sheep per annum, fifty dollars. The whole yearly loss on cattle and sheep was, therefore, one hundred and eighty-nine dollars. In forty years this annual loss, with compound interest, would amount to about thirty-five thousand dollars. Was not that "bad luck?"

Another man was "unlucky" by neglecting to employ tile-drainage on his farm. Half of it badly needed draining; and, if he had attended to it, would have netted him, exclusive of cost, a surplus crop amounting to at least five dollars an acre on fifty acres annually—total two hundred and fifty dollars a year. This loss repeated for forty years, with interest, would amount to more than fifty thousand dollars! This farmer was *very* "unlucky."

But we have known farmers to be "lucky." They were lucky with their crops, for they properly drained, plowed and prepared the soil, saved their manure, sowed with the drill, adapted the fertilizers to the ground and the crop, fought the weeds, and harvested in the best way and at the right time. They were lucky with their fruit; for they treated it as

carefully as their corn, giving wide, deep, and mellow cultivation, mulching in Winter, not by piling the mulch around the trunk, but by spreading as far as the limbs extend, fertilizing judiciously in the same way, with a compost one-third barn-yard manure, one-tenth ashes and lime, and the rest swamp muck; and by grafting wisely, pruning moderately, and watching constantly. They were lucky with their stock; for they used no scrub or grade bulls, but selected and bred their cattle with an eye to improvement, protected them from the elements, raised green crops for soiling in the Fall, cut food and steamed it in the Winter, substituted cleanliness for filth, and saved tons of hay by giving good shelter and abundant care. "Good luck" is not such a capricious fellow as many suppose; he may always be found perching on the fruit trees or walking by the reaping-machines, or hovering about the barn-yards of such farmers as these.

One of the most famous farmers of the West was the late JACOB STRAWN, of Jacksonville, Illinois. The following are some of his maxims:

"When you wake up do not roll over, but roll out. It will give you time to ditch all your sloughs, break them up, harrow them, and sow with timothy and red clover.

"Be sure to get your hands to bed by seven o'clock; they will rise early by the force of circumstances.

"I am satisfied that getting up early, industry, and regular habits, are the best medicines ever published for health.

"Pay a hand, if he is a poor hand, all you promise him; if he is a good hand pay him a little more; it will encourage him to do still better.

"Always feed your hands as well as you do yourself, for the laboring men are the bone and sinew of the world, and ought to be well treated.

"Take your time and make your calculations; don't do things in a hurry, but do them at the right time, and keep your mind as well as your body employed.

"If your barn is larger than your house, it is a sign that you may expect large profits and small afflictions.

"The best fertilizer of any soil is a spirit of industry, enterprise, and intelligence; without this, lime and gypsum, bones and green manure, marl and guano, will be of little use."

Measuring and Mapping Farms.

We are indebted to the *Country Gentleman*, of

January, 1869, for the following valuable article, giving instructions whereby any farmer can accurately measure any field of any shape. It will be worth ten times the cost of this volume to any farmer:

Importance of Mapping.—"A vast amount of valuable opportunity is lost by farmers in consequence of not knowing the exact area of their fields. Certain modes of cultivation, such as thin and thick seeding, different ways of manuring, deep and shallow plowing and planting, using different varieties of seed, and early and late cutting, variously affect the expense and amount of product; but, as the owner knows only by guessing how much his fields contain, he is unable to arrive at certain and satisfactory results, or to repeat the modes by which such results are reached. He can not know how long his team will be occupied in plowing a field, unless he knows its contents, nor say how much seed will be needed, how much manure he applies per acre, or whether he obtains thirty, forty, or fifty bushels as a crop, which may be affected five or ten bushels to the acre, according to variation in management. It may, in short, be laid down as a certain fact, that the farmer who keeps his lands constantly measured, and regularly weighs or measures their products, will learn more about good paying farming in ten years, than the careless and guessing farmer in forty.

Method of Mapping.—"Open weather in Winter often affords a good opportunity to measure fields and to map farms. A thin, crusty snow, hard enough to bear the weight, fills up hollows and furrows, and makes a rough surface more easily and accurately measured. With the simple implements we are about to describe, the measuring may be readily accomplished by any farmer. Having taken these measurements in his memorandum book, he can lay them down with measure and rule on a sheet of paper within doors, and easily calculate the area by the simple rules here given, if he knows the first rules in arithmetic. He can thus draw his whole farm on a sheet of paper, with the dimensions and contents of every field; and, if he has a little skill with pen and pencil, will make a neat and useful map. If he has but little skill, he will nevertheless make a map which, although rougher, will be accurate because its fields have been accurately measured, and will be constantly of great use and value.

Measuring Distances.—"The man who buys or sells land will require a good surveyor, with compass or theodolite, and a Gunter's chain.

corrected by the authorized standard of the county or State; but for all ordinary and practical purposes, where the farmer keeps the account with himself, this accuracy is unnecessary. Chaining always requires two persons, which is often inconvenient. If the owner can deliberately make his own measurements alone, while his men are at work, he will be much better suited, and will be more likely to enter into the business thoroughly. Pacing is too inaccurate, although some, by long practice, will accomplish it with much uniformity. One of the most rapid and convenient modes is the use of a light angular wheel, which is thrust forward as fast as the measurer walks. Figure 1 represents a wheel for this purpose, made of

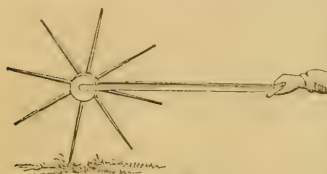


Fig. 1.—LAND MEASURER.

strips of wood a little larger than common lath—lightness being very important, in order to prevent the successive jerking which would take place if the implement was heavy, as each point strikes the earth. The wheel is of such a size as to revolve once at every rod in length. To effect this purpose, the strips must be $32\frac{1}{2}$ inches long from the center* (as calculated by trigonometry), which will give $24\frac{3}{4}$ inches from point to point. To construct this wheel, take a round piece of board about an inch thick, and saw radiating spaces into it, shaving the wood between the saw-cuts out with a sharp chisel (Figure 2); then lay in the



Fig. 2.

strips and screw them in. Then screw on another round piece of board and the hub will be complete. The radiating strips or spokes should be fitted with accuracy, so as to be firm, and the points at equal distances. Then measure from point to point, and if all are accurately $24\frac{3}{4}$ inches apart, the measurements of the land will also be correct, 8 times $24\frac{3}{4}$ being $16\frac{1}{2}$ feet. It is best to drive a nail lengthwise into the end of each arm or spoke, before whittling it down sharp, as this will prevent the point from wearing down, and becoming ultimately too short.

* Or, with great accuracy, 32.337 inches.

"A straight smooth piece of round rod iron, with a screw and nut on one end, is then inserted for an axle; and two strips of board placed on each side to receive the ends of the axle. A washer, made of sole leather, may be placed on each side of the wheel and inside the strips of board. These two strips have blocks placed between them, to keep them at suitable distances apart, and a cross-bar is passed through the rear end for a handle. For measuring farms of a moderate size, this will be sufficient, with the addition of a strip of red cloth on one of the spokes, so that each revolution may be easily seen by the operator as he pushes the machine before him. For more extensive work, two wheels, for recording are to be attached, as shown in Figure 3. These may be about six inches in diameter, and made of inch board. They are placed in the space in which the wheel revolves, which

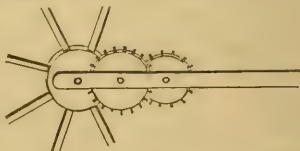


Fig. 3.—WHEELS FOR RECORDING.

must be made wide* enough for this purpose. The first has twenty small headless nails driven into its circumference at equal distances, projecting half an inch or more. A short tooth projects from the axle (easily inserted by drilling a hole), and so situated that at every revolution it comes against one of the nails, thus pushing the wheel on a short distance. At the next revolution it pushes another nail on. In this way the wheel revolves once for every twenty rods. On the axles of this wheel is a single tooth, which comes successively against one of the sixteen nails of a second wheel, made like the first. Thus the second wheel revolves once in a mile, or three hundred and twenty rods, and long distances may be easily counted without much trouble to the observer. It may be used to measure roads, either on foot or by being drawn behind a wagon. The wheels should have enough friction at the axles to prevent any possibility of their slipping; which is easily effected by a spring pressing the axles, or by boring a hole down close beside the bearings, and thrusting in a wooden plug or wedge, so as to press moderately against the axles.

This machine may be made of pine, which

is light and sufficiently stiff, but the arms or spokes should be of oak or other hard wood. If they are half an inch thick and two inches wide at the hub, tapering to an inch or less at the outer end, we have found them to be quite stiff enough. Any ingenious farmer who has a workshop will readily make one for himself, or a good joiner will do the work well—we had one made (without registering wheels) in a neat and substantial manner for three dollars. It measures land with ease and rapidity, and will soon pay for itself by the increase of knowledge which it will be the means of pouring into the farmer's mind, when he measures all his crops.

"The measurements will, of course, be most correct on smooth hard ground. On a freshly plowed field they will be attended with considerable inaccuracy, and should be made after the field is harrowed and settled. Our own experience during the past year shows that on a smooth surface there is rarely a variation of half an inch to a rod, and on ordinary farm ground or grass, not more than an inch, if well made. It is always advisable to prove the work on a piece of measured ground, to see if the spokes are of the right length.

Measuring Areas.—"Square fields, or those in the shape of a rectangle, are of course most easily calculated; all that is requisite is to multiply the length by the breadth—which, if in rods, will be divided by 160 to bring it to acres. Or, if the field is measured in chains and links or hundredths, according to the general practice of land surveyors, he has the very easy task of dividing these by ten, or in other words, simply pointing off one figure to make the product acres and hundredths of an acre.

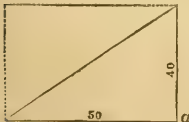


Fig. 4.

once understood. If three-sided, with one right angle, as at *a*, Figure 4, this right-angled triangle will contain precisely one-half as much as if a square or rectangle, as indicated by the dotted lines. All we have to do in this case, therefore, is to measure the two sides which contain the right angle, multiply them together, and divide by 2. For example—suppose a triangular field measures 40 rods on one side and 50 rods on the other; multiply these, and the

product is 2,000 square rods—one-half of which, 1,000, is the area—which divided by 160 gives 6½ acres. But more frequently the triangle has

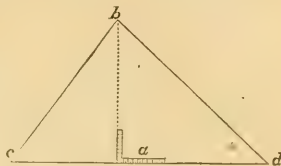


Fig. 5.

no right angle, as in Figure 5, what then? Divide it into two parts, as shown by the dotted line, making two triangles, measure them separately, and add the areas together. The dotted line must be at right angles to the side on which it falls, or nearly so—a slight variation will not affect the result materially. To do this easily, stretch a cord or garden-line, or make a straight line in any other way, place a carpenter's square *a*, on this, moving it along one way or the other until the other arm of the square points to a stake at the corner *b*. Then measure to the corner, and also measure from the square to the two other corners, and you have all the neces-



Fig. 6.

sary figures to tell readily how much land is in the field. Suppose for example, the dotted line is 40 rods long, and the two parts of the line, *c d*, are 30 and 50 rods. Multiply, and we get 1,200 and 2,000—add, and the sum is 3,200—divide by 2, and the product is 1,600 square rods, or ten acres, the contents of the field. The

most convenient way of placing this square is to saw a slit into the side of a stake near the top, drive in the stake, and place in the square (Figure 6.)

"A four-sided field with parallel sides, but

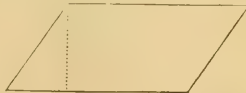


Fig. 7.

with oblique angles (Figure 7) requires that a line across it be measured at right angles to one of the other sides, as marked by dots in the figure, and then one of the sides multiplied by the length of this dotted line, which will

give the area. If only two sides are parallel,



Fig. 8.

as in Figure 8, add these two sides together, and divide the sum by 2; then multiply this quotient by the dotted line for the area.

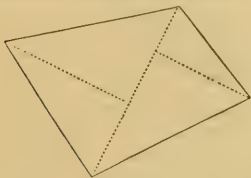


Fig. 9.

If the field is four-sided and irregular (Figure 9) cut it up into triangles, as shown by the dotted lines, and measure each of these separately, as already shown. If five or more

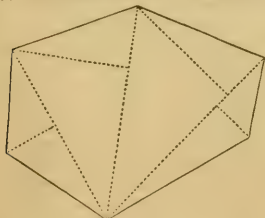


Fig. 10.

sided (Figure 10) pursue the same process. A little practice will enable any man who knows enough to own a field, to measure any piece of ground with great readiness and ease, without resorting to the complex calculations of land surveyors. This may seem like very simple instruction; but we know from observation that there are many who have not looked into the matter, who feel awkward in measuring for the want of a few simple rules, well understood by school-boys in theory, but which they hesitate in applying when called upon in practice.

Weights and Measures.—The farmer who does not habitually weigh and measure, is adrift without a chart or a compass, uncertain whether he is advancing toward success or

receding toward ruin. He works in the dark, and the result must be a loss of hundreds or thousands of dollars in the long run. Every farmer ought to keep an accurate account with every department, and to avoid being cheated, either by his stock, his crops, or his customers, he ought to have at hand the means of weighing to an ounce, and measuring to a hair, a justified half-bushel, a ten-foot pole, a measured wagon-box, a graduated granary, and, above all, a FAIRBANK'S platform-scale, that he may determine at once the vital question, How Much? Without these, the buying drover and butcher have an advantage of the farmer, for they can usually estimate the weight of an animal much closer than he can. A good pair of scales ought to save their cost every year.

What is a Horse-Power?—A horse-power, when considered as the unit of power in machinery, was defined by Mr. WATT to be "the power required to lift 33,000 pounds avoirdupois one foot high in a minute." Few farmers attach this technical meaning to it, yet it should be understood by all. The *American Agriculturist* thus more definitely explains it:

"A horse hitched to the end of a rope over a pulley, one foot in diameter, placed over a deep well, traveling at the rate of about $2\frac{1}{2}$ miles per hour, or 220 feet per minute, will draw up 150 pounds the same distance he travels. The force thus exerted, is called in mechanics, a 'horse-power,' it being an approximation to the average amount of continuous power it is fair to demand of a strong horse. If we multiply the weight raised (150 pounds) by the number of feet it was moved per minute (220), the product will be the number of pounds which the same power would raise one foot high in the same length of time (33,000 pounds).

"The dynamometer is an instrument made for measuring power, particularly that exerted in drawing. Those used for testing the draft of agricultural implements, are simply very strong spring balances, or spring steelyards, graduated to indicate the power required to raise any weight, within reasonable limit, at the rate of $2\frac{1}{2}$ miles per hour. When we apply the dynamometer, in ascertaining the draft of machines, if the index indicates 150 pounds, it is shown that the horse is required to draw just as hard as he would do if raising 150 pounds out of a well with a rope over a pulley one foot in diameter, at the rate of $2\frac{1}{2}$ miles per hour, and so for other weights.

"The velocity at which a team moves is

to be considered, as well as the weight to be raised, or the load to be drawn. In ascertaining the draft of a plow, or reaper and mower, by drawing faster than $2\frac{1}{2}$ miles per hour, the dynamometer would indicate more than the correct draft; and by driving slower the draft would appear to be less than it really is. In testing the draft of machines a team should always move at the rate of $2\frac{1}{2}$ miles per hour, or 220 feet per minute, which is the universally accepted rate with reference to which dynamometers are graduated, and an easy one to which to approximate in driving with almost any kind of team. The power of a man is estimated at one-fifth of a horse-power."

Uniformity of Weights and Measures.—During the past few years an effort has been making in Europe and America to reduce weights and measures to some common standard, whereby general uniformity might be attained.

Says Sir WILLIAM ARMSTRONG:^{*} "Science suffers by the want of uniformity, because valuable observations made in one country are, in a great measure, lost to another, from the labor required to convert a series of quantities into new denominations. International commerce is also impeded by the same cause, which is productive of constant inconvenience and serious mistake. It is much to be regretted that two standards of measure so nearly alike as the English yard and the French meter should not be made absolutely identical. The metric system has already been adopted by other nations besides France, and is the only one which has any chance of becoming universal. We, in England, therefore, have no alternative but to conform to France, if we desire general uniformity."

The five-cent pieces now in use in this country, mark an epoch in the history of our weights and measures, for they are coined in conformity to the French metric system. Each of them weighs exactly five grammes, and five of them laid along in order on the flat surface mark off a diameter in length. Thus the weight and diameter of this coin constitute the first official recognition, on the part of the United States, of the decimal system of weights and measures. The basis of this scheme, and the only arbitrary unit, is the meter. This was found by French mathematicians by measuring an arc of the earth's circumference on the meridian passing through Paris, and thus calculating the exact distance from the equator

to the pole. This distance was arbitrarily divided by 10,000,000, and that gave the unit a meter of length, which, if it is ever lost, could be recovered again by a new measurement of the earth's circumference. The circumference of the earth is, for all practical purposes, inviolable. It has undergone no perceptible contraction since the memory of man, and will undergo none for a long time to come. Perhaps it will never contract further. The meter, as thus found, is almost exactly 39.37079 inches, or 3.28089 feet; the subdivisions of this, all decimals, are marked by the Latin prefixes, *deci, centi, milli*. The multiples of this, also all decimals, are marked by the Greek numerals, *deca, helco, kili*. Thus the other French measures, founded upon this, increase or decrease regularly by ten, and are as convenient, therefore, for adding or subtracting as our dollars and cents.

The proposed change contemplates a common standard of lineal, square, and cubic measure and weight, expressed in units and decimals. There is no doubt that the decimal system is, by far, the most convenient and accurate, and that its general adoption would greatly advance science and literature, and promote international commerce.

The Cental System.—The cental system of buying and selling grain—that is, by the one hundred pounds, instead of by the bushel—was earnestly recommended in 1866 by the Albany Board of Trade, and other commercial associations, and it took effect in several of the large grain markets of the country on March 1, 1867.

By the following rule, buyers and sellers can make their own calculations. The standard weights of wheat and other kinds of grain per bushel in different States are given in the next paragraph. The price per bushel being given, to find the price per cental multiply the price per bushel by 100 and divide by the number of pounds in a bushel. For instance: At \$1 50 per bushel for wheat, what is the price per cental? $150 \times 100 = 15,000$, divided by 60 = \$2 50 the price per cental. Again: The price per cental being given, to find the price per bushel multiply the price per cental by the number of pounds in a bushel, and divide by 100. Example: At \$2 00 per cental, for oats, what is the price per bushel of 32 pounds? $200 \times 32 = 6,400$, which, divided by 100, gives 64 cents, the price per bushel. The cental system gives, no doubt, the true standard of measure, and it ought to be adopted universally in the United States. It is hoped we shall never re-

^{*}At the thirty-third annual meeting of the British Association for the Advancement of Science.

lapse into the almost obsolete "shilling" system of values, but count our money by tens and twenties; the practical introduction of the decimal system in measures would be as happy a relief.

What is a Bushel?—The following table shows the number of pounds which constitute a lawful bushel in several of the States—and the measurement in the States not mentioned is substantially the same:

ARTICLES.	Ill.	Ind.	Wis.	Mich.	Ind.	Mo.	N. Y.	Ohio.
Barley.....	48	46	48	48	48	48	48	48
Bran.....	20	20	20	0	20	20	20	20
Broom corn-seed..	44	46	46	46	46	46	46	46
Buckwheat.....	52	52	52	52	52	52	52	52
Castor beans.....	16	16	16	16	16	16	16	16
Charcoal.....	22	22	22	22	22	22	22	22
Coke.....	40	40	40	40	40	40	40	40
Corn (shelled).....	56	56	56	56	56	56	56	56
" (in ear).....	70	70	70	70	70	70	70	(old) (new)
Corn meal.....	18	18	18	18	18	18	18	18
Dried apples.....	24	24	24	24	24	24	24	24
" peaches.....	25	25	25	25	25	25	25	25
" pears.....	26	26	26	26	26	26	26	26
Flax-seed.....	56	56	56	56	56	56	56	56
Grass-seed, Blue..	11	11	11	11	11	11	11	11
" Clover.....	60	60	60	60	60	60	60	60
" Hung'n.....	48	48	48	48	48	48	48	48
" Millet.....	50	50	50	50	50	50	50	50
" Orchard.....	11	11	11	11	11	11	11	11
" Red-top.....	11	11	11	11	11	11	11	11
" Timothy.....	45	45	45	45	45	45	45	45
Hemp-seed.....	44	44	44	44	44	44	44	44
Lime (unslaked).....	80	80	80	80	80	80	80	80
Malt.....	38	38	38	38	38	38	38	38
Oats.....	32	32	32	32	32	32	32	32
Onions.....	57	57	57	57	57	57	57	57
" Top.....	28	28	28	28	28	28	28	28
Onion-seed.....	28	28	28	28	28	28	28	28
Potatoes.....	60	60	60	60	60	60	60	60
Plastering hair.....	8	8	8	8	8	8	8	8
Potatoes (Irish).....	60	60	60	60	60	60	60	60
" (Sweet).....	55	55	55	55	55	55	55	55
Rye.....	55	55	55	55	55	55	55	55
Salt (coarse).....	50	50	50	50	50	50	50	50
" (fine).....	50	50	50	50	50	50	50	50
Stone coal.....	80	80	80	80	80	80	80	80
Turnips.....	55	55	55	55	55	55	55	55
Wheat.....	60	60	60	60	60	60	60	60
White beans.....	60	60	60	60	60	60	60	60

Capacity of Various Measures.—The United States standard bushel, now adopted in most of the States, is 2150.4 cubic inches. Its dimensions are eighteen and a half inches diameter inside, and eight inches deep, and when heaped—as it should be, in measuring fruit, vegetables, coal, etc.—the cone must be six inches high = 2747.70 cubic inches, including the full cone.

The United States standard gallon is 231 cubic inches.

The dry measure gallon, without heaping, is 268.8 cubic inches.

The imperial, British, gallon, is 277.274 cubic inches; a gill is $8\frac{1}{2}$ cubic inches; a gallon of flour = 7 lbs.; ale gallon = 282 cubic inches; a chaldron (coal), = 36 bushels, = 57.25 cubic feet.

A lime bushel is $13\frac{1}{2}$ inches diameter at bottom, 15 inches at top, and 13.47 inches deep.

Any box or measure, the contents of which are equal to 2150.4 cubic inches, will hold a bushel of grain when struck level. In measuring fruit, vegetables, coal and other coarse substances, one-fifth must be added. In other words, a peck measure five times even full makes one bushel of these. The usual practice is to "heap the measure" four times full. In order to get on the fifth peck, measures must be heaped as long as what is to be measured will lie on.

A "quarter of wheat" is an English measure of eight standard bushels; so, if you see it quoted at 56s. a quarter, it is 7s. a bushel. A shilling is twenty-four cents; multiply by seven and you have \$1 68. But in the Liverpool *Price-Current*, 70 lbs. are estimated to a bushel of wheat.

A box 24 inches by 16 inches square and 23 inches deep will contain a barrel, or five bushels, or 10.752 cubic inches.

A box 16 inches by 16.8 inches square and 8 inches deep will contain one bushel, or 2150.4 cubic inches.

A box 12 inches by 11.2 inches square and 8 inches deep will contain half a bushel, or 1075.2 cubic inches.

A box 8 inches by 8.4 inches square and 8 inches deep will contain one peck, or 537.6 cubic inches.

A box 8 inches by 8 inches square and 4.2 inches deep will contain half a peck, or 268.8 cubic inches.

A box 7 inches by 4 inches square and 4.8 inches deep will contain half a gallon, or 134.4 cubic inches.

A box 4 by 4 and 4.2 inches deep will contain one quart, or 67.2 cubic inches.

A Scotch pint is equal to four English pints.

A Scotch quart is 208.6 cubic inches.

A commercial bale of cotton is 400 pounds.

The American quintal is 100 pounds.

To find the area of a circle, multiply the diameter by itself and then by the decimal .7854.

To find the contents of a sphere, multiply the cube of the diameter by .6236.

A hempen rope, one inch in diameter, will support a weight or force of 5,000 pounds, but in practice, should not be subjected to more than one-half this strain.

A rod of good iron is about ten times as strong as the best hemp rope of the same size.

The French gramme is 15.44 grains, and the kilogramme (1,000 grammes) is two pounds three ounces five drams.

GUNTER's chain, used by surveyors, is sixty-

six feet long, or four rods, and each link is 7.92 inches.

One acre contains 43,560 square feet, and the side of the enclosing square is about 208 feet 8 $\frac{5}{8}$ inches.

A fathom is six feet.

A cubit is two feet.

One cord contains 103 bushels—128 cubic feet.

A cord of fresh dung weighs four or five tons—don't overload.

It takes about four and a half bushels of fair wheat to make a barrel of flour. The usual estimate of "five bushels to the barrel" is too great.

Measuring Coal.—By applying the following rules purchasers may determine whether they receive the full weight or measurement of coal to which they are entitled. The rules were furnished by a coal-dealer of twenty years' experience:

An ordinary flour barrel holds three bushels of coal, egg, stove, or nut.

Red ash coals, of the above sizes, eight barrels, or twenty-four bushels to the ton.

Lackawanna, nine barrels, or twenty-seven bushels.

Lehigh, seven barrels, or twenty-one bushels.

Schuylkill, about seven and a half barrels, or twenty-one and a half to twenty-three bushels. Every coal-dealer knows this, and every consumer has within his power a positive check against robbery.

Another test is to measure the coal-bin, allowing thirty-six cubic feet for a ton of coal. Multiply the length, width, and height of the bin together, and divide by thirty-six, and the result will be the capacity of the bin.

Measuring Corn in a Crib.—The following rule for ascertaining the quantity of shelled corn that may be expected from an average crib of corn in the ear, is from the *Southern Agriculturist*: Having leveled the corn in the house so that it will be of equal depth throughout, ascertain the length, breadth, and depth of the bulk; multiply these dimensions together, and their products by 4, then cut off one figure from the right of this last product. This will give so many bushels and a decimal of a bushel of shelled corn. If it be required to find the quantity of ear corn, substitute 8 for 4, and cut off one figure as before.

Example.—In a bulk of corn in the ear, measuring 12 feet long, 11 feet broad, and 6 feet deep, there will be 316 bushels and 8 tenths of

a bushel of shelled corn, or 663 bushels and 6 tenths of ear corn, as:

12	12
11	11
132	132
6	6
792	792
4	8
316,8	633,6

Measuring Wheat in Bulk.—To reduce solid feet to bushels, multiply the number of solid feet by 45 and divide the product by 56; the quotient will be the number of bushels. Example: How many bushels in a box or crib 8 feet long, 4 feet wide, and 2 feet deep? Multiply the length by the width and depth, and the product by 45, which divided by 56, gives 513.7; the number of bushels which the box contains.

Weights of Various Substances.—A cubic foot of loose earth or sand weighs 95 pounds.

A cubic foot of common soil, weighs	124	lbs.
“ “ strong soil, “	127	“
“ “ clay, “	135	“
“ “ mason's work, “	205	“
“ “ distilled water, “	62.5	“
“ “ cast-iron, “	450.45	“
“ “ steel, “	489.8	“
“ “ lead, “	709.5	“
“ “ platina, “	1218.75	“
“ “ copper, “	486.75	“
“ “ cork, “	15	“
“ “ tallow, “	59	“
“ “ oak, “	73.15	“
“ “ brick, “	125	“
“ “ air, “	0.0753	“

About 16 cubic feet of sand, 18 cubic feet of earth, or 17 cubic feet of clay make a ton; 18 cubic feet of gravel or earth, before digging, make 27 cubic feet when dug; or the bulk is increased as three to two. Therefore, in filling a drain two feet deep above the tile or stones, the earth should be heaped up a foot above the surface, to settle even with it, when the earth is shoveled loosely in.

Weighing Cattle by Measurement.—Many experiments have been made by graziers and salesmen to ascertain the net weight of cattle by measurement, and a number of rules and tables have been formed of the results obtained, one method having already been given under the head of live stock. None, however, can be regarded as absolutely correct. With the most accurate measuring is required a practical acquaintance with the points and forms of animals, and allowance must be made according to the age, size, breed, mode and length of time

of fattening, etc., conditions which require a practical eye and a long experience to appreciate. The following method will lead to approximate accuracy in weighing by measure: Measure carefully with a tape line from the top of the shoulder to where the tail is attached to the back; this will give the length. For the girth, measure immediately behind the shoulder and forelegs. Multiply half the girth by itself in feet, and the sum by the length in feet, and the product will give the net weight in stones of eight pounds each. For example, with an ox or cow five feet in length and seven feet in girth the calculation will be as follows:

Multiply half the girth by itself in feet.....	2.5
	2.5
	12.25
Multiply by length in feet.....	5
Weight in stones.....	61.25
Multiply by 8 (No. of lbs. in one stone).....	8
Weight in pounds.....	499.00

Weighing Hay by Measurement.—Somebody, a few years ago, announced, and the journals have since industriously reiterated the rule, that "eleven cubic yards, or two hundred and ninety-seven cubic feet of clover hay weigh a ton; ten cubic yards—two hundred and seventy cubic feet—of meadow hay, and eight cubic yards—two hundred and sixteen cubic feet—of old stacks." And "Inquire Within" says that "a cube of a solid mow ten feet square—one thousand cubic feet—will weigh a ton." These are exaggerations in two directions, and about equidistant from the truth.

That hay must be very heavy and very firmly pressed to hold a ton within a cube of seven feet—three hundred and fifty cubic feet. And that hay must be very coarse and very light to require one thousand cubic feet for a ton.

The united testimony of thirty prominent farmers, writing from different States, tends to show that, in average hay, four hundred cubic feet at the base of mow or stack, make a ton, while it requires seven hundred feet at the top of the mow or on a scaffold. The mows throughout the country will probably average, from top to bottom, about a ton to every five hundred and twelve cubic feet. A ton, gross, will generally be found in every cube of eight feet, or in every square of twenty-three feet a foot deep.

The *Genesee Farmer* gives the following rule for measuring the contents of a stack in feet, preliminary to its reduction to tons: "When hay is sold by the stack, or where farmers wish to know the quantity they may have on hand,

measurement, instead of the tedious process of weighing, may be conveniently practiced. The first object, is to ascertain the number of cubic yards contained in the stack. As the practice of building them round or circular, is by far the most common, it is necessary in ascertaining the contents of such, to measure round them at different heights but at regular distances (omitting the part above the eaves, if it is a regular cone, as is usual), and these measurements added together and divided by their joint number will give the mean circumference. The square of this is then multiplied by the decimal .0796; the product thus obtained is again to be multiplied by the height up to the eaves with one-third of the rise from the eaves to the peak, and this last product will be the number of cubic feet in the stack. Divide this by twenty-seven and it will give the cubic yards. The measurement round may be performed by a cord, drawing it close to the stack and allowing about six inches in depth for loose hay. The height may be known with sufficient accuracy by placing a pole perpendicularly beside the stack, standing off a few rods and observing with the eye. If the stick is square or oblong, multiply the medium height (which is the height to the eaves and one-third of the rise of the roof taken together), and the last product will be the solid contents."

The process is not complex or difficult if the measurer will follow closely the directions. After obtaining the solid contents in feet, divide by five hundred to reduce it to tons, or by four hundred if it has stood more than a year.

Number of Plants to the Acre.—

It is often very convenient to know how many plants will grow on an acre at certain distances. For reference we give the following table:

Dist. apart.	No. of plants.	Dist. apart.	No. of plants.
1 foot.....	43,560	9 feet.....	537
1½ feet.....	19,360	12 ".....	362
2 ".....	10,800	15 ".....	194
2½ ".....	6,969	18 ".....	134
3 ".....	4,840	20 ".....	110
4 ".....	2,722	25 ".....	70
5 ".....	1,742	30 ".....	50
6 ".....	1,210		

Force of Windmills.—The force exerted by windmills will vary greatly with the velocity of the wind. The following table shows the pressure against a fixed surface; from the velocity given in this table, the aver-

age velocity of the sails must be deducted, and the remainder will show the real force exerted:

Miles an hour.	Pressure in lbs. on square ft.	DESCRIPTION OF WIND.
1	.005	Hardly perceptible.
2	.020	Just perceptible.
3	.045	
4	.080	Light breeze.
5	.125	
6	.180	Gentle, pleasant wind.
7	.250	
10	.500	Pleasant, brisk wind.
15	1.125	
20	2.000	Very brisk.
25	3.125	
30	4.500	Strong, high wind.
35	6.125	
40	8.000	Very high.
45	10.125	
50	12.500	Storm, or tempest.
60	18.000	Great storm.
80	32.000	Hurricane.
100	50.000	Tornado, tearing up trees and sweeping off buildings.

How much Seed per Acre!—The usual quantity of seed applied per acre for the ordinary crops in England, is as follows, under the different systems of broadcast sowing or drilling. Dibbling requires about two-thirds as much as drilling:

NAME.	BROADCAST.	DRILL.
Wheat.....	2½ to 3½ bushels.	2 to 3 bushels.
Oats.....	4 to 6 "	3¼ to 4½ "
Barley.....	3 to 4 "	2½ to 3½ "
Rye.....	2½ to 3½ "	2 to 3 "
Peas.....	3½ to 4½ "	2½ to 3½ "
Tar.....	2½ to 3 "	3 to 4 "
Emmer wheat.....	2 to 2½ "	2 to 2½ "
Clover, red.....	12 to 16 pounds.	10 to 14 pounds.
Do, white.....	3 to 4 "	"
Trifolium.....	2 "	"
Red Clover.....	2 "	"
Rye Grass.....	1 peck.	"
Turnips.....	2 to 3 pounds.	1½ to 2 pounds.
Potatoes.....	"	20 to 25 bushels.

Seeding of Weeds.—One of the most fertile sources of the continuation of weeds is that of constantly allowing them to seed on the land. Now, the enormous increase which may result from seeding may be gathered from the following table of observations made upon a few of their common species:

Common Name.	Number of Flowers.	Number of Seeds each Flower may bear.	Number of Single Plants.
Groundsel.....	130	by 50	6,500
Chickweed.....	50	by 10	500
Corn Cockle.....	7	by 375	2,500
Campion.....	25	by 137	25,137
Red Poppy.....	100	by 500	50,000
Chickweed.....	400	by 10	4,000
Black Mustard.....	200	by 6	1,200
Green Red-TAW.....	100	by 2	200
Chickweed.....	550	by 2	1,100
Corn Sow Thistle.....	100	by 199	19,900
Musk Thistle.....	25	by 150	3,750
Fool's Parsley.....	300	by 2	600
Tare.....	60	by 3	180
Wild CARROT.....	600	by 2	1,200
Wild Parsnip.....	300	by 2	1,200

plant would always perfect the quantities of seeds above tabulated; but the list gives a pretty accurate notion of the numerous seeds which might be perfected under circumstances favorable to their development, and from it will at once be gathered the important practical fact that, allowing for the casualties to which seeds are constantly liable, yet enough would be left, where seeding is allowed but for a single year, to give trouble for many years after. It can not be too earnestly urged that weeds be destroyed before their seeds are ripe.

General Hints on Tillage.—One of the greatest horticulturists of the present day says: "If I had a 'call' to preach a sermon on gardening, I should take for my text: *STIR THE SOIL.*" The produce of almost any garden can be doubled by hoeing it *every morning* while the dew is on. Remember that the hoe, industriously flourished, is a substitute for guano.

Commercial Fertilizers.—There is a tendency in the West and South to invest more largely in what are termed "Commercial Fertilizers." We have already referred to this impulse as a sign of progress in agriculture; and we return to the matter, to warn farmers to exercise the utmost vigilance and be sure they get the article they pay for. To buy some of the pure mineral manures is an excellent investment—but the trouble is, a majority of all the dealers in these fertilizers are swindlers.

This evil has become so aggravated that, without good evidence to the contrary, it is safe to assume that any manure offered in the market for sale is so far adulterated as to be about worthless. There is no class in the community that is so robbed and plundered and sponged as our farmers are by these manufacturers of commercial fertilizers. This is how the thing sometimes is done: The traders want to get up a manure that will sell for forty-five dollars a ton. That is what a good superphosphate or Peruvian guano ought to sell for; that is what it is worth to the farmer. They will buy up fish guano for twenty dollars a ton, and then mix it with charcoal, and make a manure for twenty-five dollars a ton, which they sell for forty-five dollars, and make a clear profit of twenty dollars a ton, which comes out of the pockets of the farmers. The farmers of the country are robbed of millions of dollars a year by just this process.

A farmer can not afford to pay \$25 to have a sample analyzed before purchasing; besides

Now, it is not likely that each individual

which, a single analysis is of no value. The seller will see that the genuine article goes to the chemist. What is needed, is a thorough system whereby the farmers shall be protected by the Agricultural College of each State. Let these colleges analyze, without cost to the farmer, average specimens of every fertilizer in market; then let the legislatures, and if necessary, Congress, interpose, and provide that commercial manures shall be sold with a warranted analysis, and that if they fall below the standard, the seller shall lose his entire stock by confiscation. Only heroic remedies will avail to abolish this growing evil, and defend the farmers against the plunderers.

How Deep to Cover Manure.—Manure stays nearly where it is put. If laid near the surface, it remains near the surface; if buried deep, very little of it comes up; and so it follows that a thorough pulverization and intermixture with the soil yields the best results. Forty loads of manure to the acre is only a load to four square rods, giving a uniform spread of one-third of an inch. The great bulk of it should be covered at about the depth attained by the roots of the crop to be put in.

Value of Muck and Leaves.—Muck, or peat, is not half so much used as it ought to be, as a divisor and absorbent of barn-yard manure. In itself, it contains many plant constituents, and when properly spread in yards, stables, and privies, it serves as a complete deodorizer and adds largely to the fertilizing fund. The time will come when the value of fallen forest leaves for littering stables, mulching the ground, and protecting tender plants, will be better understood than at present. For littering stables, they have every advantage over straw. They exclude the cold more perfectly. They make a fine soft bedding for horses; and as a component part of manure are not so coarse as straw, and soon decay, giving a fine texture to the compost they form. They impart similar advantages when used as a mulch, namely, lightness of covering and perfect protection. For covering tender plants, they are peculiarly fitted, being always so dry as not to suffocate or rot the plant, and the thin plates of air interposed between them, entirely excluding frost if sufficient depth is given.

A late number of the *Genesee Farmer* mentions the case of a gardener who has had remarkable success with roses, the tender kinds of which he keeps through the Winter in open ground by a thorough covering with leaves. When a foot in thickness, with a few branches

of evergreens on the top to prevent them from blowing away, no frost can penetrate them. These leaves may be found deposited a foot thick in any deciduous forest in the Fall, and may be quickly gathered with a cart, corn-basket and rake.

Season for Cutting Bushes.—One correspondent says: "I had a number of acres of land covered with bushes of different kinds—white birch, alder, hazel, white pine, etc., and I have succeeded in killing them. I cut them in the longest days in June. There are a number of days of the same length, and when I do not want to cut more than two or three days in a year, I select the middle longest days. I have cut more or less bushes every year, at the time above stated, and the result has been death to the bushes."

This, or a little later, is probably the best season to cut almost any bushes, for they are then in full leaf and vigor, and the shock is greatest. But bushes generally, especially those in swampy ground, will not be killed by one cutting, unless the succeeding sprouts are kept pastured down. Mow off short in Summer time, then turn on cattle and sheep, and the plants will hardly have a chance to catch their breath.

To Destroy Canada Thistles.—To exterminate Canada thistles involves a severe fight; the best way is to begin the battle as soon as one makes its appearance, and before the enemy has time to fortify. JOHN JOHNSTON used to fight them with plowshare, scythe and fire, and there is probably no better way. Plow early in the Spring and harrow as soon as dry; let the land lie till the thistles are in blossom, then mow them down and burn them. Turn up the roots again, and that generally finishes them. The thistles should never be thrown into the hog-pen, for some of them have vitality enough to mature their seeds. Farmers who fail to kill thistles by mowing, or ordinary Summer plowing, succeed by repeated plowings. A correspondent says: "Four years ago I plowed about four acres eight times, and have not seen one thistle on that piece of ground since, excepting where they branch out from the fence." This method is doubtless very effective.

To Destroy Sorrel.—Lime is a natural enemy of sorrel. Thirty bushels to the acre, judiciously spread, will sweeten and neutralize the acids of almost any soil sufficiently to prevent the spread of this pest. On peculiar soils, however, it seems to have but little effect; and here, deep cultivation and growing clover, buck-

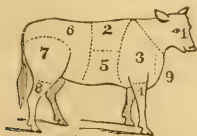
wheat, or corn sown broadcast, especially the two latter crops, will in nine times out of ten destroy it.

To Destroy Grass on Walks.—Gas tar is absolutely fatal to vegetable growth; and a coating of it spread over a walk keeps it clear as long as the tar remains. To apply it in the best manner, have the walk made and rolled hard, then put on the tar with a brush, and as it is offensive to the eye and the olfactories, cover it with a thin coat of gravel which becomes incorporated with it and forms a hard, dry, unincumbered walk. This plan is not expensive, and is believed to be certain.

Butchering.—In butchering hogs do not permit the hog to be run and worried by men, boys, and dogs, heating his blood just before killing. This is believed to make the meat tender and more apt to spoil. There is always an injury to the pork, when hogs, for convenience sake, are driven to a neighbors so as to kill together. Butchering ought to be done with as little noise and worry as possible—shooting and then sticking is probably the best way.

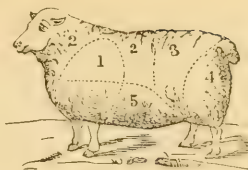
Scalding machines and long square boxes are somewhat in use, and, when properly arranged, are an improvement on tubs, but the latter are still mostly employed. They should be placed under the strong branch of a tree or a derrick, to which a rope and tackle can be attached, and there should be at least two men to each hog. Let the scald be gradual, lifting out, now and then, to keep the hair from setting, and scraping off the hair actively. Too little attention is generally given to cleaning the head and feet, leaving them for the women to worry over by the hour in some cold back-kitchen.

Cutting up Meat.—The butchers' method of cutting up meat is very diversified, almost every State having a way of its own. The cuts below will indicate modes that are largely practiced:



VEAL.

1. Head and Pluck. 2. Rack and Neck. 3. Shoulder. 4. Fore Shank or Knuckle. 5. Breast. 6. Loin. 7. Fillet or Leg. 8. Hind Shank or Knuckle. 9. Breast-brisket end.

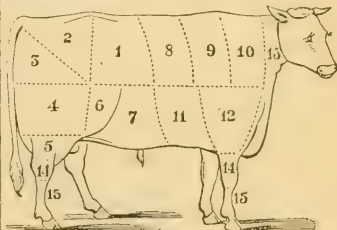


MUTTON.

1. Shoulder. 2. Neck, or Rack. 3. Loin. 4. Leg. 5. Breast.

A Chine is two Loins.

A Saddle of Mutton is two Legs and two Loins.



BEEF.

Hind Quarter.

Fore Quarter.

1. Loin. 2. Rump. 3. Thick or adze-bone. 4. Buttock. 5. Neck. 6. Thick flank. 7. Thin flank. 8. Fore Rib. 9. Middle rib. 10. Chuck rib. 11. Brisket. 12. Leg-of-mutton piece. 13. Cud and sticking neck. 14. Shin. 15. Leg.



PRIME PORK, FOR PACKING.

1. Snout. 2. Head. 3. Shoulder Pieces. 4. Prime Pieces. 7. Ham. 8. Rump. 9. Lard.

General Matters.—*Weevil.*—A farmer says that newly taken sheep-skins, after being dried, if laid upon the bins, the weevil will leave, and keeping sheep-skins on the bins of grain will effectually prevent the weevil from infesting the grain. Also, that stabling sheep in a barn near the grain will keep them out.

Dry-Rot in Wood.—A London scientific journal announces that soaking timber for a short period in lime-water is an effectual preventive for what is known as dry-rot. It says the matter has been thoroughly tested by experiment, and may be relied upon as being correct. The proportion of lime used is eighty-eight grains to one gallon of water, and the time necessary for the timber to remain in the

solution depends upon its size, and the kind of wood used. Whatever kind or size is used, it should be thoroughly saturated.

Finding Wells.—Rhabdomancy, or the power which some people claim to possess, of locating wells advantageously by means of a divining-rod—usually a stick of peach tree or witch-hazel—has long been denounced as imposture, or ridiculed as self-delusion; but it still has many intelligent champions in every country. Mesmerism, psychology, clairvoyance have all been rejected as absurd superstitions; yet they are now admitted to have facts for their basis by all candid men who have investigated them, and have been assigned a place among the recondite sciences. “Water-witchery” may also be based on fact, and may be profitably employed by those who are the custodians of its power. We know too little yet of the occult relation between mind and matter, and of the mysterious sympathies and affinities of Nature, to indulge in dogmatic assertions. Let every man trust his own senses and judgment, and remember that one fact is worth forty theories, and that one who has seen knows more about a given thing than a thousand who have not. We have abundant evidence of men who have practiced rhabdomancy with great success, and there are professional water-finders in every State who have the utmost confidence in their magnetic wands, and who, if they are deluded, make some very lucky hits.

Articles Lost in Wells.—The following illustration of the utility of science in the common occurrences of life, is from the *Genesee Farmer*: “A penknife was by accident dropped into a well twenty feet deep. A sunbeam, from a mirror, was directed to the bottom, which rendered the knife visible, and a magnet fastened to a pole, brought it up again”

The Value of the Corn-Husk.—*Hearth and Home* has the following article on the utilization of corn-husks. Everybody is familiar with husk mats, and it is well known that excellent mattresses can be made from corn-husks, but a very small proportion of the crop is saved for these purposes. It is not generally known that the husk is applied in foreign countries to many other important uses. Some writers even assert that the value of the husk crop, if utilized, would be nearly equal to that of the oat and barley crops of the country combined. We have seen most excellent husk letter paper, and it is said better paper can be made from it than from either linen or cotton rags; and, because it has great hardness and

firmness, exceeding that of the best hand-made English drawing papers, that it is especially adapted for pencil-drawing, water-colors, and short-hand writing, for which latter purpose it is extensively used. Its durability, it is claimed, renders it peculiarly valuable for documents, records, bank-notes, bonds, etc.

Corn-husks contain a long, straight, strong, flax-like fabric, which can be spun, like flax, into a thread, and the thread, like linen thread, woven into cloth of great strength and tenacity, which excels all the coarse materials in common use, in resisting decomposition. This will furnish an excellent substitute for coarse flax and hemp cloths, jute and gunny cloths, and bagging.

Again, in the course of extracting the corn fiber, long fibers are found at the bottom of the boiler in a spongy condition, filled with a glutinous substance, which, on closer examination, proves to be a nutritious dough. This may be dried and baked, and furnishes a good, wholesome, sweet bread, especially when mixed with wheat flour. It possesses the peculiarity, that it keeps perfectly sweet for months, although exposed to the air. It will not mold, and excels almost all known vegetable substances in its resistance to decomposition. Mixed with wheat flour, it would probably make a very good material for ship-bread and crackers. Cattle eat it voraciously. Of this farinaceous substance there are fifteen pounds in a hundred pounds of husks; of the long fiber, suitable for spinning, a hundred pounds of husks furnishes twenty five pounds, while, at the same time, twenty pounds of paper is afforded from the one hundred pounds of raw material—the entire valuable products being sixty per cent. of the weight of husks.

These interesting manufactures are chiefly conducted under the patronage of the Austrian government, and it is stated that the knapsacks for the Imperial army, wagon tops, floor cloths, fire buckets, and paper of all varieties, from the coarsest wrapping to the finest bank-note paper used by the government, are manufactured at the Imperial mills. Beside these, there are two private mills in operation near Vienna, conducted on an extensive scale, the owners of which, it is said, became independently rich in the two first years of their workings, their mills being several times extended and kept running night and day to fill all their different orders.

The importance of saving the husks will be fully appreciated, when it is remembered that they are simply incidental to the production of

a most important cereal, everywhere cultivated, and that they cost nothing beyond the care attending their collection and preservation. We are satisfied, says the journal we are quoting, the demand will abundantly warrant farmers in saving and storing all the husks they can. They are easily baled and marketed, like baled hay, and will bring a good price for mattresses alone. [See paragraph on Corn-husking in the preceding chapter.]

Corn-Cobs.—"How shall they be disposed of?" asks a correspondent of the *Prairie Farmer*. "One person says the most economical way is to grind them with the grain and feed them to stock. Another, that an excellent method of using them is to soak them in strong brine, and feed them, while soft, to cows and other cattle, in the yard during Winter. Most animals, it is said, will devour them greedily when thus prepared. A third recommends using them as fuel, although the women do not like such 'small stuff.' We have soaked them in the 'puddles' of the manure cellar, put two or three in the hill for corn, and found them quite useful there. Which of these ways is the best, or is there a better use for them than either?"

"There is not so great a difference, in point of actual value, we imagine, between pure corn meal and that made from corn and cobs, for feeding most animals, as many are inclined to suppose. The deficiency of alimentary matter, in the latter, is, in a considerable degree, made up by the stimulus of *distention*—bulk being, in some measure, an equivalent for nutrimental matter."

Dressing Hides.—Pelts are often lost or greatly injured by ignorant or careless management. The first thing to be attended to, is to keep them clean and free from blood or other stains.

Skinning Animals.—The value of a skin for leather depends considerably on the care with which it is taken off. An experienced tanner gives the following directions in regard to the cutting or opening of the hide before the operation of flaying: This is always best performed when the most of the skin is thrown between the fore and hind legs, leaving the hide square in its form. Tanners of upper leather know the value of this mode of skinning by its increase of measure over the one practiced by many persons in sticking or bleeding the animal, by cutting its throat from ear to ear, and in opening the hide, not running the knife far enough upon the brisket before they cut down the skin on the

fore legs; or not down far enough on the flank toward the tail before they cut through the hind leg.

Curing for the Tanner.—In ordinary weather, fresh-skinned hides should be well salted on the flesh side, then folded so as to lap the fleshy parts together, and then farther folded so as to be rolled into a small bundle. You have then a compact parcel with the hair out, easy and clean to be handled, and taking little room for transportation, and which will keep for an indefinite time, and will be the same to the tanner as green hides, which are more easily worked, tanned in less time, and make better leather than hides dried in the usual way. Salt, besides curing and keeping the skins, acts most beneficially on them, and causes them to turn out a better quality of leather. Some may object to the cost of salt, but the injury done to hides by careless management is far greater, in point of value, on an average, than the cost of three to five pounds of salt required to cure a hide.

In very hot weather, flies and bugs are so troublesome as to require that the hide be well salted, the salt rubbed in, and then hung in the sun for a couple of days; after that dried in the shade, and, when sufficiently cured, folded and put away. Hides thus kept are not so compact and convenient to handle as the green salted, but work easily, and make as good leather.

Process of Tanning.—The skins of animals, when used after merely drying them, are stiff, easily affected by water, and liable to decay. The North-American Indians dress deer skins with a thin paste made of brains, then rub them and dry them in smoke. A much better way is to impregnate them with the tannin furnished by astringent vegetables, that extract combining with the gelatin of the skin, and forming a tough and durable compound, no longer soluble in water. Tanned leather is commonly prepared in this way. The skins are previously prepared by soaking them in lime-water, which facilitates the removal of the hair. They are then immersed in the tan pits. Oak bark, from its cheapness, and the quantity of tannin it contains, is commonly employed in the preparation of leather in this country and in Europe. The bark of the hemlock spruce, and of the chestnut, the leaves of the different species of sumach, and various other astringent vegetables, are used in sections of country where oak is scarce. The strength of the astringent infusion is increased from time to time until the skin is saturated with tannin. A por-

tion of extractive matter likewise combines with the hide, and to this the brown color, which is common in leather, is owing. The presence of this extractive is supposed to render leather more tough and pliable.

When strong or saturated solutions of tannin are used, the leather is formed in a much shorter time, but it is observed that leather tanned in this way is more rigid and more liable to crack than that made in the common manner, with weaker infusions, gradually increased in strength. But sole leather, the most important requisites of which are firmness and resistance to water, is immersed in an infusion kept nearly saturated by alternate strata of bark. The full impregnation requires from ten to eighteen months.

Curing Sheep-Skin Mats.—The following is for two skins, and, if the directions are faithfully followed, will make something nice: Make strong soap-suds, using hot water, and let it stand till cold; then wash the skins in it, carefully squeezing out all the dirt from among the wool; then wash them in cold water till all the soap is out. Next dissolve half a pound each of salt and alum in a little hot water, and put into a tub of cold water sufficient to cover the skins, and let them soak twelve hours; then hang over a pole to drain. When well drained, stretch carefully on a board to dry. Stretch several times while drying. Before they get entirely dry, sprinkle on the flesh side one ounce each of finely-pulverized alum and saltpeter, rubbing it in well; then lay the flesh sides together, and hang in the shade for two or three days, turning them over every day till perfectly dry.

Finish by scraping the flesh side with a blunt knife, to remove any remaining scraps of flesh, and then rub the flesh side with pumice or rotten stone and the hands. Very beautiful mittens can be made of lamb skins tanned as above.

Curing Rawhide.—When the hide is first taken from the animal, spread it flesh side up; then take a compound of two parts of salt and two parts of saltpeter and alum combined—make it fine; sprinkle it evenly over the surface; roll it up, and let it lie a few days till dissolved. Then take off what flesh remains, and nail the skin to the side of a barn in the sun, or in dry weather stretch on the ground by driving pegs in the edges of the skin. It must be stretched tight, or there will be hard and ugly wrinkles you can not get out. After drying, and the flesh is sufficiently off, it is fit to cut up.

The Value of Rawhide.—Farmers ought to keep most of their pelts for farm use, sometimes dressing soft and sometimes using in the natural state. The *Cultivator* says: "Take a strip of well-tanned rawhide an inch wide, and a horse can hardly break it by pulling back—two of them he can not break any way. Cut into narrow strips, and shave the hair off with a sharp knife, to use for bag strings; the strings will out-last two sets of bags. Farmers know how perplexing it is to lend bags and have them returned minus strings. It will out-last hoop-iron (common) in any shape, and is stronger. It is good to wrap around a broken thill—better than iron. Two sets of rawhide halters will last a man's life-time—if he don't live too long). In some places the Spaniards use rawhide log-chains to work cattle with, cut into narrow strips and twisted together hawser fashion. It is good to tie in for a broken link in a trace chain. It can be tanned so it will be soft and pliable, like harness leather. Save a cow and 'deacon's pelt,' and try it."

Deodorizers.—We have already called attention to dried muck, and the chloride of lime, as powerful in concealing obnoxious smells, and applied as disinfectants. Ashes mixed in a privy or other out-house, are also effective in neutralizing the odors. There are other agents as successful, but not not generally so convenient as the above: A compound of one part of fine charcoal and four parts of dry, ground plaster-of-paris; the liquor of chloride of zinc; a pound of copperas in a gallon of water. Most of these absorb the ammonia and prevent its escape, thereby preserving the strength of the fertilizer. A quart or two of coal tar added to the contents of a privy, will so deodorize the same that it can be readily mixed with four or five times its bulk of garden soil; and a fertilizer thus made is equal to the best guano in market.

There is no doubt that a great deal of the sickness of families proceeds from filthy cellars, sinks, yards, privies, sties, etc. These things are neglected by many, as other duties, from pure thoughtlessness, while others never dream of paying any attention to them. The labor of cleansing one's premises by either of the above remedies is trifling, and the expense is not worth mentioning. If it were ten times greater both the labor and expense should be willingly incurred.

The Construction of Privies.—In the department of Fertilizers, especially under the heads of Night Soil and The Garden Com-

post, we have briefly treated the subject of privies, and shown how to make and manage them. We return to the matter here to exhibit the best methods of construction and to set forth the paramount advantages of dry muck or earth as a divisor and deodorizer.

Value as a Manure.—By using earth as a vehicle to save the contents of the privy's vault, instead of using water to wash it away, or employing a scavenger to cart it to the river or the sea, a vast amount of wealth might every year be saved. The *Agricultural Annual* for 1868 estimates that the human excreta annually wasted in America contain 200,000 tons of phosphoric acid, and a large quantity of other fertilizers, worth in the aggregate, to apply to land, \$50,000,000! "The good time is coming," it continues, "when (as now in China and Japan) men must accept the fact that the soil is not a warehouse to be plundered—only a factory to be worked. Then they will save their raw material, instead of wasting it, and, aided by Nature's wonderful laws, will weave, over and over again, the fabric by which we live and prosper." LIEBIG declares that the vitality of the Roman Empire was sapped by the river Cloaca, through which the whole sewerage of Rome was washed into the Tiber. The London sewers pour daily into the Thames 115,000 tons of mixed drainage. One part in thirty is regarded as rich, fertilizing, solid manure, or 3,800 tons daily. This amount would richly manure every year more than fifty thousand acres of land. It is estimated that the money value of this waste of fertilizing matter in the city of New York, exclusive of the products of the immense number of animals, amounts to \$5,475,000 annually.

Earth as a Deodorizer.—The fact that soil, especially soil which partakes of the nature of peat or muck, is a powerful deodorizer, has long been known, but its practical application has only recently been learned from Europe. Yet Nature teaches conspicuously the lesson which man has been so slow to learn. All animals of the feline race turn and cover their offensive droppings with earth. In *Deuteronomy*, xxiii, 12 and 13, we read:

"Thou shalt have a place also without the camp, whither thou shalt go forth abroad: And thou shalt have a paddle upon thy weapon; and it shall be when thou wilt ease thyself abroad thou shalt dig therewith, and shalt turn back and cover that which cometh from thee."

The Earth Closet.—The earth closet seems destined to supersede the water closet in Amer-

ica, as it is already being substituted in Europe. It is based on the power of earth as an absorbent, and is very simple in its construction. The only indispensable machinery is a pail or other vessel, and a supply of dried earth to sift in the bottom of the vessel, and, after use, to cover the deposit. The earth and a convenient scoop may be kept in an adjacent box. A quart is ample to use each time.

A commode managed in this way, may be kept in the house without any unpleasant odor arising from it; indeed, it may stand in a sick room without the slightest annoyance, greatly promoting the comfort of all. It will not need emptying more than once a week, or whenever it is full. From the instant of covering the evacuation, all offensive smell ceases, and is absorbed and neutralized by the earth.

The accumulation becomes thoroughly mixed and rapidly dries to a uniform powder, the excretions having disappeared. The pail used in the commode should be of galvanized iron, with a cover of the same, and in emptying it may be carried down through the house with no more offensiveness than a hod full of common coal ashes. Not only will the excretions have disappeared, but the paper used will also have been completely destroyed.

On removal, the produce, which will be wholly inodorous, should be piled in some dry place and occasionally turned over. At the end of two or three weeks it will be entirely dry, and fit for use for the same purpose again. "When the ordure is completely decomposed," says GEORGE E. WARING, Jr., of Newport, Rhode Island, in a treatise on this subject, "it has not only lost its odor, but it has become, like all decomposed organic matter, an excellent disinfectant, and the fifth or sixth time that the same earth is passed through the closet, it is fully as effective in destroying odors as it was when used the first time; and of course each use adds to its value as manure, until it becomes as strong as Peruvian guano, which is now worth \$75 per ton."²

The earth-closet, if used by six persons daily, will require, on an average, about one hundred pounds of earth per week. This must be artificially dried, and coarsely sifted, and sand will not be found effective. No slops must be thrown into the vessel. These conditions are imperative; and to observe them with care will not require so much time as to provide water for a water-closet, while all disa-

²"EARTH-CLOSETS: How to Make and Use Them." Published by the New York Tribune Association.

greeable effluvia will be prevented, and a manure as rich as guano will be saved.

Indeed, farmers near villages will find it a good investment to prepare and deliver the dried earth for the privilege of removing the aggregate deposits—which may be made so strong by repeated use, that “*a hundred pounds* will be a good dressing for an acre of land,” according to Mr. WARING.

An unreasoning prejudice exists in many minds against having so simple a contrivance in the house, and servants and others may at first shrink from the novelty and imagine difficulties; but the briefest trial will carry conviction, and the soil, after having been, with the dissolved excretions, passed six, or even eight, times through the closet, will still be perfectly inodorous, and may be taken in the hand fearlessly without anything more unpleasant than in lifting common sand. This seems incredible, but the facts are abundantly vouched for.

Our English cousins have had several years experience, and the earth-closet is being everywhere introduced—in private houses, hotels, schools, prisons, factories. Rev. HENRY MOULE, of Dorsetshire, has patented a closet on this principle, so constructed as to let earth fall upon

the droppings by a simple mechanical contrivance connected with an earth reservoir in the rear of the seat, somewhat upon the plan of water-closets. The principle in this, or a simpler form, ought to be adopted and made practical at once, in every county in the United States.

A correspondent has adopted the principle of earth-closets as follows: “The house is built in the usual manner. Under the seats I have a drawer made of two-inch stuff, put together with brown paper and white lead, made so that it can be drawn out at one end of the house. I cover the bottom of the drawer with about three inches of dry earth and then sprinkle a shovelful of plaster over it. The drawer is cleaned out once a week, and the contents go to increase my manure pile. So far I have not found any smell coming from the arrangement, although we have had a pretty hot Summer, and the privy is within fifteen feet of my house. The drawer runs on two slides, and when in place is covered on the ends by doors. This is my earth-closet. An improvement would be to have a box in each compartment full of dry earth, and a scoop so that more earth could be thrown on from time to time. As yet I have not found this at all necessary.”

DOMESTIC ECONOMY:

THE HOUSE—GENERAL EQUIPMENT AND MANAGEMENT. THE LAUNDRY AND KITCHEN—PRESERVES, JELLIES, AND BEVERAGES.

WE have already indicated the general features of a good farm, and how to manage it, and the characteristics of a good house and how to build it; but a convenient residence, surrounded by a picturesque landscape in fertile fields, does not necessarily insure the existence of a comfortable Home. A household, whose hearth shall have unfailing attractions for father and mother, sons and daughters, and guests, implies a constant supervision of love, and frugal skill—an eye for harmony, an intelligent and dextrous hand, and that subtle instinct which invests everything with the final charm when art has done all it can. "Men talk in raptures of youth and beauty, wit, and sprightliness," says WITHERSPOON, "but, after a seven years' union, not one of them is to be compared to good family management, which is seen at every meal and felt every hour in the husband's purse."

Furniture.—There are few general rules for furnishing a house, except such as are too vague to be of much practical value. Of course, the first thing to be considered is expense; everything being necessarily limited to the size of the purse. The next thing is Fitness—an equally rigid adaptation to the size and style of the residence, and to the habits of the occupants, summed up in what artists call Expression. Small, plain dwellings, externally embellished by Nature's prodigal hand, require little aid from internal art, and should be furnished in a fresh and simple style. Marbles, heavy gildings and damask hangings would be incongruous in such a home; while it is equally evident that lofty mansions, fronted with colonnades, mounting into Mansard roofs, or ornamented with bay-windows and orioles, would have a mean appearance if set out with such articles as might be sufficient and elegant in a cottage.

Whether the house be large or small, care

should be taken not to subdivide so much that the rooms become too contracted for comfort. The sitting-room and kitchen should always be the largest rooms in the house; and eight rooms, with these two rooms reduced, will always be found less comfortable than six with these two rooms spacious.

These important rooms should also receive the sun a portion of every day. A room without sunshine is only half furnished. The semi-darkness which envelopes some houses is very unwholesome. A tadpole without light will never become a frog. A child deprived of light becomes an idiot, as witness the goiter and cretinism, among the dwellers in the gorges of the Swiss Valois, where the direct sunshine never reaches. A large proportion of the inhabitants are deaf, blind, incapable of articulate speech, dwarfed, and deformed. Epidemic attacks, as a rule, those on the shady side of a street or house, and exempt those on the other front. Let in the sun!

Paper Hangings.—A proper selection here is of considerable importance; for the wall-paper is the background which holds in relief everything else in the room. And there is scarcely any article in which a bad selection produces such a wretched effect. Here the printers are greatly reprehensible for the low standard of popular taste, in the production of wall-papers of every degree of tawdry coloring and repulsive design.

The choice of a wall-paper should be guided in every respect by the character of the room in which it is to be used. The most important question is, whether it is to form a decoration in itself or become a mere background for pictures. In the latter case, the paper can hardly be too plain or too subdued in tone. Neutral shades, such as very light drab or buff, delicate pink or silver-gray, embossed white or cream color, will be suitable, and two shades of the same color will almost always be found sufficient.

Large flowing patterns are seldom in good taste; they reduce the apparent height and size of a room, and when bright colors predominate, form the worst possible background for pictures.

Any person of refined taste experiences a shock to his sensibilities on entering a room whose walls are papered with misshapen daubs and scrawls, a foot square, in brick-red, blue, and yellow, connected by gaudy strands, each figure repeated in endless iteration, though bearing a likeness to nothing in heaven above or earth beneath or the waters under the earth. As a rule, the simplest patterns are the best for every situation; though where pictures are to be few there may be greater variety of figure. Intricate forms should be accompanied by quiet color, and a variety of hue should be chastened by the plainest possible outlines. Light, graceful figures, in vines and flowers, are suitable, and are agreeable objects upon which to rest the eye. Tiny branches of ferns and maiden-hair grouped together, and tied with wisps of variegated grass, scattered over a surface-tint of lavender, made on faint rose-color, would light up prettily in chambers.

Miss MARY E. MURTFELDT offers some excellent suggestions, in the Illinois Agricultural Report: "Small striped patterns, or where the figures are arranged in perpendicular lines, have the effect of increasing the seeming height of a room, and should always be chosen where the ceilings are low. For a small parlor, a delicate cream-colored ground, with a gold leaf, is very pretty; or a white ground, with tiny clusters of flowers in pale colors. To our eye, however, the most beautiful paper of all, and one forming the most desirable and harmonious background for other objects in a room, is a satin paper of one color, pale buff or pink, heavily varnished, and finished with a rich, deep border of crimson and gold, or green and gold. It would seem to be very plain, too plain, perhaps, for any but the most unpretending parlors, but one can scarcely imagine the air of elegance it imparts to a room."

Kitchen walls should never be papered; they have a much more cleanly look with a fresh coat of whitewash every few months.

For drawing-rooms, lavender is a favorite hue; it is now customary to border with some rich, positive color, extending it along the top and bottom and down the corners. Crimson velvet and gold paper hangings are a charming background for statuary or pictures, and light up finely. Green and gold were popular at

one time, until chemists discovered that Paris green, into the composition of which arsenic largely enters, was the chief coloring matter, and that the air became so surcharged with its baleful influence, that the health of the inmates was sadly affected. Green must, therefore, be avoided, although a favorite color.

Bed-rooms should be hung with such patterns and colors as furnish repose to the eye, and do not admit of distortion by any freak of vision. SOPHIE O. JOHNSON, in *Hearth and Home*, offers some valuable suggestions on this point: "For family rooms we would prefer hangings in which the design is not apparent, and its repetitions can not be counted. When wearisome days and nights come to us; when forced to toss on beds of pain, we know, from experience, the *positive* suffering that such a paper hanging can inflict. We would select small traceries, or plain tinted papers—buff, tea, mode, rose, or lavender—to adorn rooms where we may be compelled to lie ill.

"Papers are manufactured purposely for nurseries to amuse and instruct children. Different countries, costumes, and animals, are introduced in pencil-tints, and they can be taught geography from the walls of their nurseries. On one side, India is depicted with its groves of palms, its temples, elephants, natives, etc. On the other, Africa is portrayed; the Nile is seen; rhinoceroses, crocodiles, and hippopotami in its waters, or on its shores, and in the distance the thatched huts of the blacks. Again, Germany's fair fields and Switzerland's huge mountains blend together. The effect is really charming; the children live in a mimic Zoological Garden."

When a room needs to be repapered, all the old paper should be carefully removed, as an accumulation of it upon walls is very unwholesome, and is apt to generate fevers. A little turpentine mingled in the paste at the time of papering, is a sure remedy against the deprecuations of all insects.

Kalsomine wall-paper is an English invention, and consists in coagulating the sizing with which the colors of paper hangings are mixed, by the aid of a solution of alum, by which means it is made insoluble, and the surface of the paper may then be washed with as little damage as if it were covered with oil.

Carpets.—The designers of carpets have vied with the wall-paper men in their lavish display of horrible patterns. They seem to have taken lessons from everything but Nature. The carpet ought to bear an important part in the

adornment of a room; it oftener serves as a positive blemish. How frequently are floors concealed by a great gaudy blotch of confused colors—a spread of yard-wide “figures,” suggestive of nothing but discord and ugliness!

Mrs. JOHNSON well says: “To the woods, ye designers; study there the perfect beauty of coloring in that mossy carpet spread wide beneath your feet; gaze upon the rare combination of hues; the trailing vines which cover its velvety surface; the exquisite blending of subdued tints; here and there the coralline berries, and tiny white flowers sprinkled over it; and go home to destroy your hideous designs, and prepare those whose colors will never weary the eye, and whose design will partake of the divine. We remember a carpet which was to us perfectly beautiful; its groundwork imitated the green mosses, with a dash of brown lichens, and over its surface were scattered bouquets of scarlet verbenas, interspersed with lilies of the valley and their lance-shaped leaves.” It will be expedient to keep these suggestions in mind in the choice of a carpet, and to apply some of the general rules given for wall-paper.

The carpet, however, should carry more positive colors than the paper. The lovely neutral tints which are so attractive, soon grow dull and dingy, and their beauty is gone. “Dark-ground works, which are often chosen under the mistaken impression that they will not soil, quickly show the least bit of dust, and will not wear as long as a carpet of lighter hues. Dark browns and black will soon wear out—the dyes used in these colors seem to destroy the durability of the texture. White is the strongest color in a carpet, the wool retaining all its natural strength, and it does not soil more quickly than light colors. Scarlet and green are colors of great durability; blue and crimson not as fast.”

Small figures should always have the preference in carpets; the warp runs under and over much oftener, thereby greatly increasing its thickness. Turkish and Persian patterns are highly recommended on this account; the designs are rich, and are most suitable for hall or dining-room. Scotch ingrain carpets are coming into great favor for floors which have much wear. The texture is strong and good, and the colors, like all Scotch dyes, invincible. They are reasonable; \$1 25 to \$2 00 per yard, and serviceable for nursery floors. Closely-woven ingrain carpets and the three-ply are best for common use. If well made, they are more de-

sirable than the average Brussels, because they can be turned, and so will usually give longer service.

Some of the most chaste and elegant carpets, conveying an impression of cut velvet, are those consisting of only one color, in different shades, or, perhaps, the various shades of two colors, skillfully blended. The carpets of sitting-room and parlor, especially, should be light and of cheerful contrasts.

In furnishing a house, it is generally economical to select a handsome carpet, and use the same pattern for several rooms—especially chambers. In this way there is less waste in laying, and as they wear out, portions of the most worn can be used to renovate the least worn. We have seen whole floors furnished in this manner to excellent advantage.

Carpets should generally be cut in pieces two or three inches shorter than the room in which they are to be laid to allow for stretching; and it is well to buy a couple of yards more than are required, anticipating a possible transfer to a larger apartment, or the wearing threadbare of a place in front of piano or sofa.

The “life” of any carpet may be prolonged for years by laying straw matting or any coarse drugget, or tow, under it; these are much better than loose straw, which gathers dust and tends to wear out the carpet in spots. A carpet-fork, a cheap and simple implement to be had at any hardware store, is almost indispensable in carpet-laying.

Bed-rooms should have straw matting instead of carpets in Summer. Carpets gather dust, besides which they are heating, and are inviting to insects. In England they use two or three small rugs about the bed, which are removed and aired every day, but straw matting is more agreeable. Oil-cloth or a painted floor may be substituted in the dining-room. No other country uses carpets so universally and indiscriminately as America. In Europe polishing the floors is found much more desirable.

Stair-carpets may be protected by a very simple method—much better than by an unsightly covering with linen or oil-cloth. In purchasing, buy two yards more than the length of stairs required, and in laying, fold under a part of the surplus at each end. Take up the carpet to shake once in three or four weeks—as the dust accumulates rapidly and is very destructive—and on replacing it, double under more at one end and less at the other, so that the carpet will fold over the angles of the stairs in a new place every time. In this way stair-

carpets will last twice as long as without such pains. They may also be made more durable by placing thick folds of paper nearly as wide as the carpet and five or six inches broad, over the edge of each stair, which prevents the wearing at that place.

The little machine called a carpet-sweeper, is preservative of the carpet as well as the housewife. It makes both last longer. Before using it, however, the carpet should be sprinkled with some damp tea leaves, or moist Indian meal. A little salt is frequently used instead. These are absorbents of dust, while they also tend to freshen the colors. Of course they should be swept away carefully. It is economical to frequently shake carpets that are much used.

Carpets that are soiled can easily and safely be washed on the floor in the following manner: Take them up and shake thoroughly; give the floor a good scrubbing; nail them down again, and scrub with scrubbing-brush in cold soap-suds, with a tea-cupful of ox gall mixed in to fix the colors. Wash off suds in plain cold water, and wipe with a drying-cloth. Then raise the windows and open the doors, and do not let the room be used for two or three days.

All carpets, except Wilton and other plushes, can be washed in this way. Before washing, however, they should be somewhat cleansed, the stains being removed with diluted ammonia, and the grease spots with a paste of potter's clay; or a dust of potter's clay, covered with brown paper, and the grease drawn out with a hot iron. Raw potatoes, grated on, are sometimes used to remove dirt. If there is any appearance of moths in carpets when they are taken up, sprinkle tobacco or black pepper on the floor before the carpets are put down, and let it remain there.

Oil-cloth ought never to be wetted, if it can be possibly avoided, but merely to be rubbed with a flannel, and polished with a brush of moderate hardness, exactly like a mahogany table, and by this simple means the fading of the colors, and the rotting of the canvas, which are inevitably attendant upon the oil-cloth being kept in a state of moisture or dampness, are entirely avoided.

Other Articles of Furniture.—Modern artistic taste and mechanical skill have left very little to be desired, either in articles of use or ornament. Most of the commonest conveniences have borrowed the semblance of beauty, and independent of their utility, would grace any

apartment. About the only difficulty in this matter is to know where to stop furnishing, unless the purse dictates. Comfort demands a few articles; fashion many; a fancy for the novel and bizarre still more.

Of course the style of furniture, especially that which is upholstered, should be adapted to the style of the rooms, the carpets and the general appointments. Our limits will not admit of any particular descriptions of furniture, or any list of articles required for the various departments.

We may remind our readers, however, that there are two rules which should be kept in mind when equipping a house; first, if there must be a scarcity of furniture in any department, let it be in the parlor rather than the kitchen; second, let the furniture be arranged so as to give an appearance of ease and graceful negligence to the general aspect of the parlor and living rooms, avoiding all stiffness and formality. In the selection of furniture, personal refinement will do more to insure success than mere wealth; good taste, supported by moderate means, will prove far more effective than uncultivated taste with an inexhaustible treasury. In fact, by attention to harmony of color and the disposition of drapery, and with some little constructive ingenuity, a house may be attractively furnished for a very small sum.

Filling Beds.—Beds should be filled with barley straw in preference to rye, oatens, or wheat straw; and with clean split corn-husks greatly in preference to either. The husks of Indian corn, carefully selected, and slit into shreds, make an excellent article for beds. They are durable, clean, cheap, elastic, not very likely to absorb moisture, and are not objectionable on account of making dirt. It is calculated that a good husk bed will last from twenty to thirty years.

Household Ornaments.—A cheerful disposition, resulting in family harmony and "good will to men," will do more than anything else to illuminate and decorate a house, but very useful adjuncts are to be found in flowers, pictures, brackets, and the countless *bijouterie*, many of which are elegant and inexpensive. Household ornamentation, with purchased trinkets, should of course be held subordinate to the provision of family necessities and to the calls of neighborhood benevolence—duty before pleasure.

Yet how cheaply can a room be decorated by a woman of taste! There are a hundred little

trifles that cost nothing, but lend an infinite air of refinement, and an assurance of human sympathy. How the touch of a cultured hand lights up a room! A flower-pot clinging to a window-ledge and holding a climbing vine up to the sun, tells that a poet lives there.

Flowers.—Here we take the liberty of quoting from an article by HARRIET BEECHER STOWE, in *Hearth and Home*: "If you live in the country, or can get into the country and have your eyes opened and your wits about you, your house need not be condemned to an absolute bareness.

"For example: Take an old tin pan condemned to the retired list by reason of holes in the bottom, get twenty-five cents worth of green paint for this and other purposes, and paint it. The holes in the bottom are a recommendation for its new service. If there are no holes, you must drill two or three, as drainage is essential.

"Now put a layer one inch deep of broken charcoal and potsherds over the bottom, and then soil, in the following proportions: Two-fourths wood-soil, such as you find in forests, under trees; one-fourth clean sand; one-fourth meadow-soil, taken from under fresh turf. Mix with this some charcoal-dust.

"In this soil plant all sorts of ferns, together with some few swamp-grasses, and around the edge put a border of moneywort or periwinkle to hang over. This will need to be watered once or twice a week, and it will grow and thrive all Summer long in a corner of your room. Should you prefer, you can suspend it by wires and make a hanging-basket. Ferns and wood-grasses need not have sunshine—they grow well in shady places.

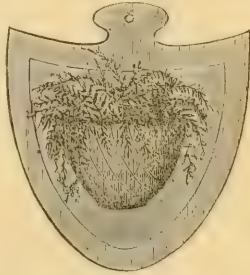
"On this same principle you can convert a salt-box or an old fig-drum into a hanging-basket. Tack bark and pine-cones and moss, upon the outside of it, drill holes and pass wires through it, and you have a woodland hanging-basket, which will hang and grow in any corner of your house.

"We have been into rooms which, by the simple disposition of articles of this kind, have been made to have an air so poetical and attractive that they seemed more like a nymph's cave than any thing in the real world.

"Another mode of disposing of ferns is this: Take a flat piece of board sawed out something like a shield, with a hole at the top for hanging it up.

"Upon this board nail a wire pocket made of an ox-muzzle flattened on one side. Line this

with a close sheet of moss, which appears green behind the wire net-work. Then you fill it with loose, spongy moss, such as you find in swamps, and plant therein great plumes of fern and various swamp-grasses, they will continue



to grow there, and hang gracefully over. When watering, set a pail under for it to drip into. It needs only to keep this moss always damp, and sprinkle these ferns occasionally with a whisk-broom to have a most lovely ornament for your room or hall.

"The use of ivy in decorating a room is beginning to be generally acknowledged. It needs to be planted in the kind of soil we have described, in a well-drained pot or box, and to have its leaves thoroughly washed once or twice a year in strong suds made with soft soap, to free it from dust and scale-bug; and an ivy will live and thrive and wind about in a room, year in and year out, will grow round pictures, and do almost anything to oblige you that you can suggest to it."

Ivy can be grown with marvelous success in vials of water, with no earth whatever, the vials hanging upon the walls of the room, holding the base of the cuttings. From this simple nourishment, the hardy plant will thrive and put forth leaves, and climb and twine about windows and pictures with the utmost grace.

A Wardian Case.—"But the cheapest and most delightful fountain of beauty is a Wardian case. Now, immediately all our economical friends give up in despair. Wardian cases sell all the way from eighteen to fifty dollars, and are like everything else in this lower world, the sole perquisites of the rich.

"Let us not be too sure. Plate-glass, and hot-house plants, and rare patterns are the especial inheritance of the rich; but any family may command all the requisites of a Wardian case for a very small sum.

"A Wardian case is a small glass closet over

a well-drained box of soil. You make a Wardian case on a small scale when you turn a tumbler over a plant. The glass keeps the temperature moist and equable, and preserves the plants from dust, and the soil being well-drained, they live and thrive accordingly. The requisites of these are the glass top and the bed of well-drained soil.

"Now, suppose you have a common cheap table, four feet long and two wide. Take off the top boards of your table, and with them board the bottom across tight and firm; line it now with zinc. You will now have a sort of box or sink on legs. Now make a top of common window-glass such as you would get for a cucumber frame; let it be two-and a half feet high, with a ridge-pole like a house, and a slanting roof of glass resting on this ridge-pole; on one end let there be a door two feet square.

"We have seen a Wardian case made in this way, in which the capabilities for producing ornamental effect were greatly beyond many of the most elaborate ones of the shops. It was large, and roomy, and cheap. Common window-sash and glass are not dear, and any man with moderate ingenuity could fashion such a glass closet for his wife.

"The sink or box part must have in the middle of it a hole of good size for drainage. In preparing this for the reception of plants, first turn a plant-saucer over this hole, which may otherwise become stopped. Then, as directed for the other basket, proceed with a layer of broken charcoal and potsherds for drainage, two inches deep, and prepare the soil as directed in the beginning of this article, and add to it some pounded charcoal, or the scrapings of the charcoal-bin. In short, more or less charcoal and charcoal-dust is *always* in order in the treatment of these moist subjects, as it keeps moisture from fermenting and growing sour.

"Now for filling the case. If you make a Wardian case in the Spring, your ferns will grow beautifully in it all Summer, and in the Autumn, though they stop growing, and cease to throw out leaves, yet the old leaves will remain fresh and green till the time for starting the new ones in the Spring. But supposing you wish to start your case in the Fall, out of such things as you can find in the forest; by searching carefully the rocks and clefts and recesses of the forest, you can find a quantity of beautiful ferns whose leaves the frost has not yet assailed. Gather them carefully, remembering that the time of the plant's sleep has come, and that

you must make the most of the leaves it now has, as you will not have a leaf more from it till its waking-up time in February or March. But we have succeeded, and you will succeed in making a very charming and picturesque collection. You can make in your Wardian case lovely little grottoes with any bits of shells, and minerals, and rocks you may have—you can lay down, here and there, fragments of broken looking-glass for the floor of your grottoes, and the effect of them will be magical. A square of looking-glass introduced into the back side of your case will produce charming effects.

"The trailing arbutus or May-flower, if cut up carefully in sods, and put into this Wardian case, will come into bloom there a month sooner than it otherwise would, and gladden your eyes and heart. But among the most lovely things for such a case is the partridge-berry with its red plums. The red berries swell and increase in the dampness, and become intense in color, and form an admirable ornament.

"Then, the ground pine, the princess pine, and various nameless pretty things of the woods, all flourish. In getting your sod of trailing arbutus, remember that this plant forms its buds in the Fall. You must, therefore, examine your sod carefully, and see if the buds are there; otherwise you will find no blossoms in the Spring. There are one or two species of violets, also, that form their buds in the Fall, and these will blossom early for you.

"A Wardian case has this recommendation over common house-plants, that it takes so little time and care. If well made in the outset, and thoroughly drenched with water when the plants are first put in, it will, after that, need only to be watered about once a month, and to be ventilated by occasionally leaving open the door for a half hour or hour, when the moisture obscures the glass and seems in excess.

"To women embarrassed with the care of little children, yet longing for the refreshment of something growing and beautiful, this glass garden will be an untold treasure. The glass defends the plant from the inexpedient intermeddling of little fingers, while the little eyes, just on a level with the panes of glass, can look through and learn to enjoy the beautiful, silent miracles of nature. For an invalid's chamber such a case would be an indescribable comfort. It is, in fact, a fragment of the green woods brought in and silently growing; it will refresh many a weary hour to watch it."

Window Flowers.—Every house should have

its beautiful parterre—a miniature green-house, even if it be but a single flower-stand, or a few pots for a window. These add not a few charms to the home-circle during the cold Winter months. These sweet adopted children of the household must not be starved nor put off on half rations. Be sure to give them an annual supply of fresh earth. In the case of roses, geraniums, and other vigorous growers, the earth or “compost” in which they are potted, should be rich with fertilizing matter. For such plants, equal parts of *old* barn-yard or stable manure, well-rotted sods (those from an old pasture are the best) and clean sand, well mixed together, will form an excellent potting compost. If the compost be prepared several months before using, so much the better. Equal parts of thoroughly rotten stable manure, swamp muck, and sand, have been used with the very best results; the manure and muck were of the richest quality. Where it is not convenient to change the earth at least once in each year, house-plants should receive frequent applications of liquid manure. A table-spoonful of guano dissolved in a gallon of water, or a shovelful of old stable manure in three gallons of water, will form a good liquid fertilizer for house-plants. It should be applied about once a week, in sufficient quantities thoroughly to penetrate the earth in the pots.

A generous supply of warm water is necessary for most plants, yet too much, on the other hand, would ruin them when the temperature is low. Shortening in all straggling growth, removing every leaf and flower as soon as it shows signs of decay, frequent sponging and syringing of the foliage, and judicious airing, will be apt to result in success.

Other Devices.—One of the prettiest and most simple of wall decorations is a sweet-potato vine. It resembles ivy in appearance, but has the peculiar advantage of growing very rapidly when once started.

It can be grown in a shaded room, and will twine about household things in a familiar and graceful way peculiar to itself, creeping around the pictures and winding its tendrils about their cords; or, clustering in window-corners, it will play bo-peep among the curtains in quite a charming way, and at last will send forth its pretty convolvulus flowers to brighten all the room.

If you wish to prove this pleasant fact select an ordinary-sized sweet potato, and place it in a large-mouthed glass jar. It is not absolutely

necessary to have a *glass* jar, unless one wishes to watch the sprouting process, which is beautiful and interesting. Cover the potato with water nearly to its top, leaving only an inch or two uncovered, and replenishing every other day, to make up for what is lost by evaporation; and in about five weeks it will begin to sprout. It requires subsequently but very little attention, it being only necessary to keep the roots constantly covered with water. The vine will be found to grow much faster when suspended in the sunshine, though it grows rapidly anywhere. Sometimes it is more convenient to place the vase containing it on a bracket hung against the wall. The pendant shoots will add to its pretty effect, while those which have a tendency to creep upward will soon find something to which they can cling.

To make a very pretty ornament, cut off the crown or top of a large carrot, leaving attached to it about half an inch of the carrot; place it in a saucer of water, which you may conceal with moss. The beautiful fern-like sprays of the carrot will continue green and growing for several months, and may be surrounded with exotics, to which it will lend a grace. Or, cut off two inches of the carrot, dig it out, and hang it, inverted, full of water, and it will soon present a very unique appearance.

A beautiful and easily-attained show of evergreens may be had by a very simple plan, which has been found to answer remarkably well on a small scale. If geranium branches, taken from luxuriant and healthy plants, be cut as for slips, and immersed in soap-water, they will, after drooping for a few days, shed their leaves, put forth fresh ones, and continue in the finest vigor all the Winter. By placing a number of bottles thus filled in a flower-basket, with moss to conceal the bottles, a show of evergreen is easily insured for the whole Winter. All the different varieties of the plant being used, the various shapes and colors of the leaves blend into a beautiful effect. They require no fresh water.

Take a saucer and fill it with fresh, green moss. Place in the center a pine-cone, having first wet it thoroughly. Then sprinkle it plentifully with grass-seed. The moisture will close the cone partially, and in a day or two the tiny grass spires will appear in all the interstices, and in a week you will have a perfect cone of beautiful verdure. It only wants a plentiful supply of water to be a “thing of beauty” all Summer.

Plants and Aquariums.—Aquariums are now so well understood as to be in a fair way to become essentials in the room-gardening of all persons of taste. Growing plants, fishes, and water reptiles are placed in the same globe or tank of water, and the gases which the fish reject are the food of the plants; while the plants, on the other hand, prepare the elements necessary for the use of the fish. By this beautiful principle of reciprocity, both plants and animals remain in perfect health, without the water scarcely ever being changed. A tank for plants and animals might form the base of a pretty parlor ornament, a central portion consisting of a case for ferns and similar plants, and a cage for birds on the top.

To Restore Frozen Plants.—Ten chances to one, ladies, you will be tempted some of these fine days to put out the flower-pots in the sun; and by the same token, you will be tempted "out to tea," and of course to spend the evening, trusting that Sukey, Sally, Jane, or Joe, or some of them, will take in the flower-pots out of the freezing evening air. Vain hope! You return home to find a dozen of the choicest and most tender frozen to a crisp. Now, don't get in a passion, hot enough to thaw them, if you do you will kill them—and that is not all that is killed by passion either, in many a family. Order a tub of water deep enough to immerse the whole plant; bring the pots out of the cold one at a time and put them in the water about five minutes. Take them out and drain off the water and dry them as well as possible; set them in a dark room and keep the temperature at 50° or 60° for a few days, and your sick patients will recover.

To Preserve a Bouquet.—A florist of many years' experience sends the following receipt for preserving bouquets to the *American Artizan*:

"When you receive a bouquet sprinkle it lightly with cold water; then put it in a vessel containing some soap-suds, which nourish the roots and keep the flowers as good as new. Take the bouquet out of the suds every morning and lay it sideways in fresh water, the stock entering first into the water; keep it there a minute or two, then take it out and sprinkle the flowers lightly by the hand with pure water. Replace the flowers in the soap-suds and the flowers will bloom up as fresh as when gathered."

Others preserve cut flowers by adding a pinch of nitrate of soda, or of saltpetre, to a tumbler of water, every time they change the water.

Pictures, etc.—A few pictures assist greatly

in giving a house a furnished look, even if its setting out be in other respects meager. Besides this, if well chosen, they are missionaries of refinement and morality.

One good picture is worth twenty indifferent ones; indeed, the greater number of poor pictures you have, the worse you are off, for they are a positive degradation and disfigurement. Blank walls are vastly better. A bad oil-painting is particularly odious, and nothing betrays vulgarity and ignorance more infallibly than walls hung with wretched caricatures in oil, purchased of itinerant vendors "at a great bargain." These have done much to vitiate the taste of our people.

If you can not afford good oil-paintings, executed by known artists, then procure the best engravings from steel or stone; or choice photographs; or some of the handsome German, French, or American chromo-lithographs.

Of engravings, the very large copies are not so much in request; the small, delicate French engravings, or photographs, with a wide border, being much choicer. In chromos, which are printed paintings, the last few years have witnessed a great improvement, until some of the best pieces are very cheap and very beautiful—scarcely less desirable than the oil-paintings of which they are copies, and far better than average paintings that cost five times as much.

Chromo-lithography marks the advent of Democracy in art; and LOUIS PRANG, of Boston, is rendering a most valuable service in placing low-priced pictures, of real merit, within the reach of the great body of Americans. Already he has introduced some of the rarest inspirations of LANDSEER, ROSA BONHEUR, CHURCH, BIERSTADT, EASTMAN JOHNSTON, TAIT, BRITCHER, and others, to the homes of the common people. To poultry and birds, and fruit and flower pieces, he has added landscapes and life-groups, and his later productions are equal to the German, while they are procurable at half the price. Chromo-lithography is the apotheosis of printing. No other style of picture so combines cheapness with beauty, and it can not fail to elevate the public taste, as it supersedes the atrocious painted wood-cuts that still find room in our thousand wayside cottages and country homes. No people in Christendom buy so many pictures as Americans, and no people display upon their walls such artistic horrors. May chromo-lithography hasten the revolution in the popular taste, until we shall no longer see NAPOLEON crossing the yellow Alps on a blue horse,

or ABRAHAM LINCOLN borne by GEORGE WASHINGTON to a green sky.

What PRANG has done for painting, ROGERS has done for the sister-art, sculpture; his charming statuettes finding thousands of buyers who have never before felt able to patronize art. Nothing can be prettier than these to render a parlor, library, or hall attractive.

It is not well to hang oil paintings or highly-colored chromos on the wall of the same room with engravings; for, unless pictures correspond, the higher-toned will be likely, so to speak, to "drown" the more subdued pieces, even though the latter may possess the greater merit. To do pictures justice, they must be hung in a proper light and in harmonious company. They will not bear crowding. A picture should be hung so that the line of sight of a person standing in front will pass perpendicularly to the center of it; this rule being slightly modified by the height of the room.

To keep clean the gilding of picture-frames, dust them with a soft feather-brush or bit of cotton batting.

For libraries and halls maps are more appropriate than pictures. In dining-rooms hang bird and fruit pieces.

The Laundry.—Washing-day should, as far as possible, be regular, and much is generally gained by assigning Tuesday, instead of Monday, to this work. This gives a day for collecting, assorting, and other preparations.

On the evening previous to washing, all the clothes should be gathered up and assorted; woolens, linens, cottons, and fine clothes being bundled separately. If a washing preparation is used (and amid the great number sold there are a few which are doubtless an aid to the washer and not injurious to the clothes), this should be got in readiness over night. Many of the little jobs which a family always require done the first of the week can also be done by this arrangement before the washing is undertaken, and if the house and children are neat and tidy, the housewife is better prepared for other duties.

All the clothes, except woolens and colored pieces, should be put asoak over night, the very dirty parts having soap rubbed on them. If you use washing-fluid it should be mixed in the soaking water; if you use no wash mixture, the next morning wring out the clothes, and proceed to wash them carefully through two warm lathers; then boil them in clean lather briskly, but not longer than half an hour.

Wash them out of boil—rinse through two waters. The last rinsing water should have a delicate tinge of blue, likewise a small quantity of starch, for all cottons and linens; reserve those you wish stiffer for the last, and mix more starch in the water.

Shirt-bosoms and collars, skirts—in short, anything you wish very stiff, should be dipped in starch while dry. Swiss and other thin muslins and laces should also be dipped in starch while dry, and then clapped in the hands in the right condition to iron. Calicoes, brilliants, and lawns of white grounds should be washed like any other white material, omitting boiling, until the yellow tinge they acquire shall have made it absolutely necessary. Unbleached cottons and linens follow the white clothes through the same waters, but in no case should they be boiled or washed with them, as they continually discharge a portion of their color, and so discolor the white clothes.

In directing preparations for washing-fluids, we give the process employed with them; but colored clothes can be washed in few of them without injury to the color. Calicoes, colored lace, and colored cottons, and linens generally, are washed through two suds and two rinsing waters; starch being used in the last, as all clothes look better, and keep clean longer, if a little stiffened. Many calicoes will spot if soap is rubbed on them; they should be washed in a lather, simply.

A table-spoonful of ox gall to a gallon of water will set the colors of almost any goods soaked in it previous to washing. A tea-cup of lye in a bucket of water will improve the color of black goods. A strong clean tea of common hay will preserve the color of those French linens so much used in Summer by both sexes. If the water in which potatoes are cooked is saved, and boiled down, it stiffens black calicoes as well as starch, and saves them from the dusty and smeared look they so often have. Vinegar in the rinsing water for pink or green calicoes will brighten them. Pearlash will answer the same end for purple and blue. Colored and white flannels must be washed separately; and by no means wash after cotton or linen, as the lint from those goods adheres to the flannel. There should be a little bluing in the water for white flannels.

Hard water may be softened by dissolving half an ounce of quicklime in nine quarts of water, and the clear solution put into a barrel of hard water, and it will become soft when

clear. A little borax powder will have the same effect.

Clothes Lines.—Use the rope clothes line no longer; for you can do much better. Go to the nearest telegraph station and buy their galvanized wire for a cent a foot or less, and stretch it over your poles, between your trees, or upon your frame. The wire will last for twenty years without rusting or breaking; it will not injure your clothes in any way; it never needs to be taken in; you will have purchased for a trifle, a line, just as good because just the same as the patent "White Wire Clothes Line," so extensively advertised and sold at four times the price. And you will never use a hempen clothes line again.

"Washing Made Easy."—Do not be humbugged out of a dollar for anything with this title. We present below a variety of recipes for washing-fluids and preparations, some of which have been sold for hundreds of dollars in the aggregate, and all of which are of unquestionable value as an auxiliary. The reader must test them to ascertain their relative merit. The borax is all that is claimed for it. We present no recipes for washing soap, because such soaps are now in general use, and can be purchased as cheap as they can be made, excepting in the case of large establishments.

Sal-Soda and Lime.—"Take one pound of sal-soda, half a pound of good stone lime, and five quarts of water, boil a short time, let it settle, and then pour off the clear fluid into a stone jug, and cork it for use. Soak your white clothes over night in simple water, wring out and soap the wristbands, collars, and stained or dirty places. Have your boiler half-filled with water, just beginning to boil; then put in one small tea-cupful of the fluid, stir and put in your clothes, and boil for half an hour, then rub lightly through one suds only, rinsing well, bluing as usual, and all is complete. Soak your calico and woolen in the sudsing water, while hanging out the white ones, then wash them as usual, of course washing out woolen goods before you do the calico. This fluid brightens, instead of fading, the colors in calico.

"This plan requires very little wash-board rubbing for white clothes, saves half the soap, and more than half the labor, and saves the wear of rubbing through two suds before boiling, and is a good article for removing grease from floors and doors and to remove tar and grease from hands and clothes." This is the

washing-fluid most widely used, and is, perhaps, as good as any.

Mrs. Twelvtree's Recipe.—"To every twenty gallons of warm water, add one bar of soap, seven table-spoonfuls of spirits of turpentine, and one of sal-ammonia, and let the whole stand for one night undisturbed. In the morning put in the *fine* clothes, and let them soak *one hour*, or, if very dirty, one and a half hours; then take them out, wring, and rinse well in clear water; wring and rinse again in blue-water; then dry. The coarse linen may be put in the same water and undergo the same process. *No rubbing is necessary*, and the clothes will be perfectly clean and sweet. The composition will not injure the finest fabric." Our readers will take, with a grain of allowance, the information that with this fluid "*no rubbing is necessary*;" the best washing-fluid, if the clothes are much soiled, needs slight assistance from the knuckles. But the above is an excellent cleanser.

Borax.—The washer-women of Holland and Belgium, who are so proverbially clean, and who get up their linen so beautifully white, use refined borax as a washing powder instead of soda, in the proportion of a large handful of borax powder to about ten gallons of boiling water; they save in soap nearly half. All the large washing establishments adopt the same mode. For laces, cambrics, etc., an extra quantity of the powder is used, and for crinolines (requiring to be made very stiff), a strong solution is necessary. Borax, being a neutral salt, does not in the slightest degree injure the texture of the linen, and is less injurious to colored cotton fabrics than soda is.

Its effect is to soften the hardest water, and, therefore, it should be kept on every toilet table. To the taste it is rather sweet; it is used for cleansing the hair, is an excellent dentifrice, and in hot countries is used in combination with tartaric acid and bicarbonate of soda as a cooling beverage. Good tea can not be made with hard water; all water may be made soft by adding a tea-spoonful of borax powder to an ordinary sized kettle of water, in which it should boil. The saving in the quantity of tea used will be at least one-fifth.

To Wash White Lace.—The following recipe for washing white lace is generally found more successful than any other. Cover a glass bottle with white flannel, then wind the lace round it, tuck it to the flannel on both sides, and cover the whole with a piece of flannel or linen, which

sew firmly round it. Then steep the bottle over night in an ewer, with soap and cold water. Next morning wash it with hot water and soap, the soap being rubbed on the outer covering. Then steep it again for some hours in cold water, and afterward dry it in the air or near the fire. Remove the outer covering and the lace is ready, no ironing being required. If the lace is very dirty, of course it must be washed a great deal.

To Wash Woollens.—The chief cause of the shrinking of flannels and other woollen goods is found in a sudden transition from hot to cold. The best way to avoid this is to shrink the cloth before it is made up into wearing apparel. Everybody knows that flannel shrinks by successive washings, and garments often become valueless from this cause. A notable housewife, of our acquaintance, prevents it as follows: Before the flannel is made up, inclose it in a cotton bag, to prevent permanent staining by contact with the boiler, place it in clear, cold water over the fire, and apply heat till the water boils, then take the flannel out and dry. By this process it will shrink an inch or so to the yard, but it will never become distorted in shape by subsequent contraction.

Or, make a strong suds and put in your flannel or white woollen stockings, while the water is boiling hot. Then squeeze and pound them with a pestle till the water is cool enough to put your hands to the work. You will find there is little need of rubbing. Rinse in water as hot as the hands will bear.

An old merino may be made to look "as good as new" by first ripping to pieces the skirt, and afterward washing each breadth separately in warm suds, being careful to rinse only in clean warm water-suds. Iron while quite damp, on the wrong side. Afterward fold once double on the right side, placing over it a clean newspaper, and iron with a very hot flat-iron, in this way making the seam fold in all new double-folded goods.

Soft Soap.—Much difficulty is often experienced by those who manufacture their own soft soap; frequently, indeed, the operation succeeds well, but sometimes it totally fails from unknown causes. Often when every precaution has been apparently taken, complete failure has been the consequence; and the time is not long past, when some have even declared that they believed their soap was bewitched. But if the rationale on which the process is founded, is but understood, the whole becomes

simple and easy, and may be performed with an absolute certainty of success.

Common soft soap is composed of oil (or fat) and potash. The potash is obtained from common wood ashes, by causing water to run through them, which dissolves the potash contained in the ashes, and leaves the residue behind. The manner by which the oil or grease is obtained is well known. These are made to unite and form soap by being boiled and well stirred together.

One of the first requisites in soap making is, that there should be a sufficient quantity of potash dissolved in the water, or in other words, that the lye should be *strong*; this is readily ascertained by an egg; if the egg floats the lye is sufficiently strong; if it sinks, it is too weak, and must be increased in strength by evaporating a part of the water by boiling, or by passing it again through ashes. The best soft soap, such as will keep through our insect-haunted Summers, can not generally be made with a smaller proportion of alkali to grease than pound for pound.

The following is a good recipe: Take twenty pounds of potash, and dissolve it in twenty-five gallons of cold soft water (an iron kettle is the best to put it in). It will take five or six days to dissolve it unless the weather is perfectly warm. When dissolved, take twenty pounds of clean grease, or rough grease that will make that weight, and cleanse it with white lye; then strain it through a sieve or cullender in a soap barrel, and add the potash lye, being careful not to disturb the sediment; then soak the sediment of the potash with a few more gallons of soft water, and pour it into the barrel, so as to save all the strength of the potash.

But it not unfrequently happens that the lye is found by trial to be strong, and yet good soap can not be produced. This is almost always owing to the potash of the lye not being *caustic*, or capable of corroding the skin, which state is absolutely requisite to success. Potash in its purest state is highly caustic; but where ashes have been for some time exposed to the air, they gradually absorb from it a portion of the peculiar kind of air existing in small proportion in it, known by the name of *carbonic acid*, which destroys the caustic properties of the potash and renders it unfit for the manufacture of soap. Now as quicklime has a stronger attraction for carbonic acid than potash has, it is only necessary to place a quantity of lime, in the proportion of half a bushel of lime for a

hogshead of good ashes, in the bottom of the lee: h before filling it, and it will abstract the carbonic acid from the potash of the lye, as it passes downward, leaving it in a comparatively pure and caustic state. In order to prevent failure, therefore, this should always be done. In order to ascertain if lye contains carbonic acid, pour a few drops of sulphuric or nitric acid into a wine-glass of the lye, when if it contains much, a violent effervescence (or boiling up of bubbles) will instantly take place, owing to the escape of the carbonic acid. The carbonic acid may be removed from the lye and render it fit for soap making, by boiling the lye with quick-lime.

If the lye be *strong*, if it be rendered *caustic*, and if there be a sufficient quantity of tolerably *clean fat*, there can be little danger of success. The proportions should be about thirty pounds of fat to eight or ten gallons of lye.

Soft soap should be kept in a dry place in the cellar, and not be used until three months old.

Hard Soap consists of soda instead of potash, united with fat; and is commonly made by adding common salt (which consists of muriatic acid and soda) to well-made soft soap, while it is yet boiling. The soda of the salt unites with the fat, and forms hard soap, while the potash unites with the muriatic acid of the salt, and separates by falling to the bottom of the vessel. Different degrees of hardness in soaps are obtained by using potash and soda, at the same time, in different proportions. Hence, grease from salt meat has a tendency to increase the hardness of soap, unless the salt be previously removed by boiling in water.

Soap of tallow is made in England, and largely in the United States, and is the best in common use; when scented with oil of caraway seeds and cast into a mold, it is used for the toilet and is called Windsor soap. Other toilet soaps are made with butter, hog's lard, or with almond, nut, or palm oil. Sometimes fish oil is used for coarse soaps, as well as linseed oil; and rosin is often added to give a yellow color, and odor. The following proportions (by weight) have been given for a good yellow soap: tallow twenty-five, oil four and a half, rosin seven, barilla (soda) eighteen, settlings of waste lye, evaporated or calcined, ten, and palm oil a half part.

Soaps are colored blue, by indigo, yellow by turmeric, etc.; and marble or veined soaps are made thus: To the soap just separated from the spent lye, new lye is added, and then copperas dissolved in water; red oxide of iron (or colco-

thar) mixed with water, is stirred in, and by manual dexterity, is so mixed as to produce the peculiar appearance.

The Cold Process.—In Virginia there is a mode of making soap, adopted by the country people, which they call the "cold process," that deserves to be made generally known. It is thus described by a farmer's wife: "I put my barrel (a common fish barrel) in the cellar where it is intended to stand, and fill it nearly full of strong lye; then add as much grease without melting it, as I think sufficient, stirring it once every day or two. In a few days I can tell whether I have put too much or too little grease, and add lye or grease as the case may require. In two or three weeks it becomes excellent soap. We call it the cold process. In this way we make better soap, get rid of the trouble and risk of boiling, and can make it as suits our convenience, or occasion requires."

White Hard Soap.—Put a box of the "concentrated lye" into two quarts of boiling water; when dissolved, take three pounds of soft fat (or lard) and two pounds of tallow; melt it; strain if necessary, and then stir the lye in the fat gradually, until it becomes thick and smooth as cream; then cover it well, and allow it to cool gradually. When done and cold, cut in cakes or bars. This makes a very nice soap, and if desired, perfumery may be added.

Washing Soap.—The following is a recipe for making the labor-saving soap already referred to for washing. The recipes for making have been sold at from \$5 to \$10, and the soap seven cents per pound; but can be manufactured for about two cents. Take two pounds of sal-soda, two pounds of yellow bar soap, and ten quarts of water; cut the soap in thin slices, and boil all together two hours, then strain it through a cloth; let it cool, and it is fit for use. Directions for using the soap: Put the clothes in soak the night before you wash, and to every pail of water in which you boil them, add one pound of soap. They will need no rubbing; merely rinse them out, and they will be perfectly clean and white.

Toilet Soap.—To four quarts slaked lime add two pounds sal-soda. Dissolve the soda in two gallons of soft water. Then mix in the lime, and stir it occasionally for one hour. Then let it settle; pour off the clear liquor, then add two pounds of clean grease. Boil until all is dissolved, then pour it off into some vessel to cool, and cut into such shape as suits the fancy. You can flavor this soap with anything you desire. It will make the hands

soft, and prevent them from cracking, and is far better and cheaper than any toilet soap that can be bought at the stores.

Plain Starching.—This requires some care and attention. The best vessels to make it in are those of brass, bell-metal, copper tinned, or earthenware pipkins. If starch were made in a tin saucepan, it would be a chance if it did not burn. An iron saucepan would burn it black. It would be discolored by copper, if the inner surface of the copper were not tinned. The very best vessel for starch-making is a bell-metal skillet. Mix the starch with cold water till it is of the consistence of common paste, carefully pressing abroad all the lumps. Then pour upon it boiling water in the proportion of a pint to an ounce of starch. If the starch is pure, and without blue, add the quantity of blue necessary to give it the proper tint, to the boiling water, before it is poured on the starch, which is effected by putting the blue into a flannel bag and letting the water dissolve a sufficient quantity. Set the skillet over the fire, and stir the starch with a clean wooden spoon. When the starch has boiled up, remove it from the fire. When the starch is required more than usually stiff, a little isinglass may be dissolved and mixed with it after it is removed from the fire.

Clear Starching.—This is accomplished by rinsing the articles to be starched carefully in three waters. Then dip them in the starch, which should be previously strained through muslin, squeeze and shake then gently, and hang up to dry. When dry, dip them in clear water, and again squeeze them, spread on linen, and roll up and let remain an hour before ironing. In ironing, use highly polished irons, and you will be astonished at the beautiful gloss imparted.

Cold Starching.—There is economy in stiffening the collars and wristbands of shirts with unboiled starch. Take as much of the best raw starch as will fill half a common tumbler, or a half-pint cup. Fill it nearly up with very clear cold water. Mix it well with a spoon, pressing out all the lumps, till you get it thoroughly dissolved. Next, add a tea-spoonful of salt, to prevent its sticking. Then pour it into a broad earthen pan, and add gradually a pint of clear cold water, and stir and mix it well. Do not boil it.

The shirts having been washed and dried, dip the wristbands into this starch, and then squeeze it out. Between each dipping, stir it up from the bottom with a spoon. Then

sprinkle the shirts, and fold or roll them up with the collars and wristbands folded evenly inside. They will be ready to iron in an hour.

This quantity of cold starch is sufficient for the collars and wristbands of a dozen shirts. Ladies collars may be done up with cold starch, if the muslin is not very thin. Muslin dresses and curtains can also be profitably cold-starched if they are ironed promptly; by this method they put on an appearance of newness scarcely attainable in any other way.

Gloss on Linen.—To restore the gloss commonly observed on newly-purchased collars and shirt bosoms, add a spoonful of gum-arabic water to a pint of the starch as usually made for this purpose. Two ounces of clear gum-arabic may be dissolved in a pint of water, and, after standing over night, may be racked off, and kept in a bottle ready for use. This preparation will add a gloss to linens, and will give to lawns, either white or printed, a look of newness, when nothing else can restore them after they have been washed.

Grease Stains.—These are from grease, oil, etc., and are simply removed by alkalis or soap, or by essential oil dissolved in alcohol. Alkalies, such as solutions of saleratus or liquid ammonia, will remove them safely from all substances without color. Grease spots may also be removed by a compound made of equal parts of soft-soap and fuller's earth. For colored substances, the alcoholic solutions spoken of will do, and among them burning-fluid answers a good purpose. But the best of all is the preparation termed benzine or benzole, which excels anything else we know of in efficiency. Lay a paper under the fabric and apply the liquid. Oil spots, and stains from candle snuff, on woolen table covers, paint spots on garments, etc., are thus perfectly removed, without the slightest discoloration. Magnesia is sometimes used with good effect, being rubbed on the cloth, some clean paper laid over, and a hot iron applied.

Another good solvent of oily matter is the following: To half a pint of pure alcohol add ten grains of carbonate of potash, half an ounce of oil of bergamot, and one ounce of sulphuric ether; mix, and keep in a glass-stoppered bottle. Apply with a piece of sponge, soaking the cloth thoroughly when the grease is not recent.

Grease may be removed from carpets and other woolen fabrics as follows: Cover the grease spot with whiting, and let it remain until it becomes saturated with the grease; then scrape it off, and cover it with another coat of whiting,

and, if this does not remove the grease, repeat the application. For wall-paper, make a paste of fuller's earth, ox-gall, and water.

The following method may sometimes be used advantageously: "As soon as possible after oil has been spilled upon a garment, take and immerse it in clear cold water. After soaking awhile, the oil will begin to float upon the surface; when this takes place, change the water. By frequently renewing it, the oil will gradually, in the course of a few hours, become completely removed, without rubbing or washing; when dry, iron it, and no vestige of the oil will remain, nor will any change in the color be visible."

There is nothing better for coat-collars, etc., than ammoniated alcohol. Strong pearlash water mixed with sand, and rubbed on grease-spots on floors, is one of the most effective things that can be used to extract the grease.

Acid Stains.—These may generally be known by reddening black, brown, and violet dyes, and all blue colors except Prussian blue and indigo. Yellow colors are generally rendered paler, except the color of annatto, which becomes orange.

These stains are neutralized by alkalis. A spot, for instance, on a woolen coat, from strong vinegar or sulphuric acid, may be entirely removed by applying a solution of saleratus. Apply it cautiously until the acid is exactly neutralized, which may be known by the restoration of color; and then sponge off the salt thus made by means of a sponge. Acid stains may sometimes be removed by letting the cloth imbibe a little water, and holding a lighted match near it, or exposing to the fumes of burning brimstone. Ammonia is better for delicate fabrics.

Sweat stains are chiefly occasioned by a little muriate of soda and acetic acid—which produce nearly the same effects as acids generally, and are to be removed in the same way, operating cautiously.

Alkaline Stains.—These are the opposite of acid stains—they change vegetable blues to green, red to violet, green to yellow, yellow to brown, and annatto to red. They are to be treated with acids. "The writer once had a new pair of dark cloth pantaloons changed to a light brown below the knees, by riding on a load of fresh lime in a sturn. 'Oh! you have ruined your clothes!' was the exclamation; but he deliberately procured a cup of vinegar, and sponging the cloth gradually, completely restored the color, and then again sponging off the compound, left them as good as before."

Iron Stains.—These come from iron-rust, ink, etc. To remove them, the iron is first dissolved by a solution of oxalic acid in water. The oxalate of iron thus produced, which, unlike iron-rust, is soluble, is readily removed by washing or soaking. Ink spots (tanno-gallate of iron) upon the printed leaves of books, are removed in the same way—but the lamp-black of the printer's ink is not at all effected. If fresh, such spots may be wholly effaced; if old and dry, a very little will remain.

Wheel grease makes a compound stain of grease and iron. The grease may be taken out first by alkali; and then the iron by oxalic acid. If tar has been used on the wheel, rub on lard, which will dissolve it, and then apply the alkali. Turpentine will answer nearly the same purpose as lard.

Vegetable Stains.—These include fruit stains, and may be removed with chlorine or sulphurous acid. A diluted solution of chlorine will remove them; or, if practicable, chlorine in a gaseous state will be better, the place being wet. Sulphurous acid, or the strong fumes of burning sulphur, on the moistened stain will effect the same purpose, but much more slowly, and perhaps more safely. Both these substances will, however, remove any other vegetable color which may have been used for dyeing the fabric.

To remove stains from calico or other colored substances, without affecting the original hue, requires not only a knowledge of the materials used in dyeing, but of those which will dispel the stain without affecting these dyes, and would be too extended a subject for our present limits.

Ammonia, or spirits of hartshorn, diluted with water and applied with a sponge is excellent for this purpose. Dilute muriatic acid, two parts water to one of acid, will frequently succeed. Soak the stained parts two or three minutes, and rinse in cold water. Some faint stains may be removed by sour buttermilk. Fresh fruit stains upon calico or similar material may be removed by dipping the stained portion in boiling water.

A few drops of carbonate of ammonia, in a small quantity of warm rain water, will prove a safe and easy anti-acid, etc., and will change, if carefully applied, discolored spots, upon carpets, and, indeed, all spots, whether produced by acid or alkalis. If one has the misfortune to have a carpet injured by whitewash, this will immediately restore it.

Mildew.—Wet the cloth which contains the

mildew with soft water; rub it well with white soap; then scrape some fine chalk to powder, and rub it well into the linen; lay it out on the grass, in the sunshine, watching it to keep it damp with soft water. Repeat the process the next day, and in a few hours the mildew will entirely disappear.

Another: "Take two ounces of chloride of lime and pour on it a quart of boiling water; then add three quarts of cold water. Steep the linen in this for twelve hours, and every spot will be gone." Citric acid and salt are sometimes used.

Alcohol will remove almost any discoloration.

Chloroform is an excellent article for the removal of stains of paints from clothes, etc. Portions of dry white paint which successfully resisted the action of ether, turpentine, benzine, and bisulphate of carbon are at once dissolved by chloroform.

The following will restore scorched linen: Peel and slice onions, and extract the juice by pounding and squeezing; add half an ounce of shred white soap, two ounces of fuller's earth, and half a pint of vinegar; boil together, and when cool spread it over the scorched linen, and let it dry on; then wash out the linen.

To Bleach White Woolen Goods.—Take a dry goods box, or a barrel, if it be large enough, stretch some strong cords across it, and upon them hang the articles you wish to bleach. Get a pound of brimstone, pound it fine; put an old pan or kettle into your box, and put in some live hard wood coals, upon which sprinkle a table-spoonful of the brimstone; cover closely and do not open it for three hours; then add more coals and more brimstone; repeating the process until the garments are sufficiently white. Be careful not to inhale the smoke for it is very deleterious. The articles must be quite clean, and be wet in clean soft water when they are put into smoke. You can bleach white kid gloves.

Ink Stains.—If soaked in warm milk before the ink has a chance to dry, the spot may usually be removed from any fabric. This is one of the very best remedies. Oxalic acid is used by some, and is excellent for white, but there is great danger of injuring colored goods, even when an after application of ammonia. Sal-ammonia is also effective, but, like oxalic acid, it sometimes removes more color than is desirable. Another resource is a saturation of melted tallow; rub till the tallow comes out, and the ink will generally accompany it. Tar-

taric acid and lemon juice are each often effective.

To take ink out of a white table-cloth, use a plentiful mixture of salt and pepper on the spot promptly, and all trace of the ink will soon disappear. A lady describes the successful use of oxalic acid as follows: "My first thought was that the dress was ruined; the second was to dip the skirt at once into warm water, rinsing as much ink out as possible, but what was left made a rueful sight—hand-breadths of doleful thunder dark color, over the light Summer dress. Quick, it was plunged into a warm solution of oxalic acid—hot, that it might take effect sooner. Care was taken to dip only the spots into this liquid (there are some people so stupid they will need to be told to do this), and in a minute they faded, of course, taking the color of the stripes with them. The linen was rinsed in warm water again, and wet with a dilution of ammonia, which changed the skirt to its original color, and the dress was as good as ever."

A saturation of milk is generally the most convenient, and is almost always effective.

To Clean Kid Gloves.—Have ready a little new milk in one saucer, and a piece of brown soap in another, and a clean cloth or towel folded two or three times. On the cloth spread out the glove smooth and neat. Take a piece of flannel, dip it in the milk, then rub off a good quantity of soap on the wetted flannel, and commence to rub the glove toward the fingers, holding it with the left hand. Continue this process until the glove, if white, looks of a dingy yellow, though clean; if colored, till it looks dark and spoiled. Lay it to dry, and the operator will soon be gratified to see that the old glove looks nearly new. It will be soft, glossy, smooth, and elastic.

By a much simpler process, soiled gloves of all colors may be washed with alcohol, or alcohol and camphene, without either staining them, or leaving an unpleasant odor about them. The gloves are merely drawn upon the hand and carefully rubbed with a piece of clean white flannel, wet with alcohol, until the soil is removed, then hung up to dry, and afterward slightly stretched, when the original color reappears. This we have from one who has tried it successfully.

Spirits of turpentine and benzine are also used with great success.

Directions for Cleansing Silk Goods.—When silk cushions, or silk coverings to furniture, become dingy, rub dry bran on them gently,

with a woollen cloth till clean. Remove the grease spots and stains. Silk garments should have the spots extracted before being washed. Use hard soap for all colors but yellow, for which soft soap is the best. Put the soap into hot water, beat it till it is perfectly dissolved, then add sufficient cold water to make it just lukewarm. Put in the silks, and rub them in it till clean; take them out without wringing, and rinse them in fair lukewarm water. Rinse them in another water, and for bright yellows, crimsons, and maroons, add sulphuric acid enough to the water to give it an acid taste, before rinsing the garment in it.

To restore the colors of the different shades of pink, put in the second rinsing water a little vinegar or lemon-juice; for scarlet use a solution of tin; for blues, purples, and other shades, use pearlash; and for olive greens, dissolved verdigris in the rinsing water; fawns and browns should be rinsed in pure water. Dip the silks up and down in the rinsing water; take them out of it without wringing, and dry them in the shade. Fold them up while damp; let them remain to have the dampness strike through all parts of them alike, then put them in a mangle; if you have not one, iron them on the wrong side with an iron just warm enough to smooth them. A little isinglass or gum-Arabic dissolved in the rinsing water of gauze shawls and ribbons, is good to stiffen them. The water in which pared potatoes have been boiled is an excellent thing to wash black silks in; stiffens and makes them glossy and black. Beef's gall and lukewarm water, is also a nice thing to restore rusty silk, and soap-suds answers very well. They look better not to be rinsed in clear water, but they should be washed in two different waters.

If a little powdered magnesia be applied on the wrong side of silk, as soon as the spot is discovered, it is a never-failing remedy, the stain disappearing as if by magic. Salts of ammonia, mixed with lime will take out the stains of wine from silk. Spirits of turpentine, alcohol, and clear ammonia are all good to remove the stains from colored silks.

To Clean a White Ostrich Feather.—A lather should be made with lukewarm water and white curd soap; the feather must then be shaken in the lather for some time, occasionally passing it between the fingers, until, from the state of the water, the principal part of the dirt appears to have been removed. A second lather must then be used, but not containing quite so much soap. After well rinsing the

feather in this, it must be gently pressed with a soft clean handkerchief, and then waved backward and forward before the fire, but at a little distance from it, until quite dry. A very small quantity of soda and a slight coloring of blue should be added to the water before the lather is made.

To Renew Veils.—Black tissue veils may be renewed by dipping them in thin glue water; shake them till nearly dry, and then smooth with a moderate iron. A black cloth should be spread over the ironing-sheet.

To Renew Old Crape.—A bit of glue dissolved in skim-milk and water will restore old crape. Another way is to lay it out over night in the dew, bring it in moist in the morning, and lay it, folded, in a paper under a slight pressure until it is dry.

A good way of cleaning oil-cloth is to sponge it well with skim-milk, as it brightens it and preserves the color.

To Cleanse Feather Beds and Mattresses.—When feather beds become soiled or heavy, they may be made clean and light by being treated in the following manner, considerably practised in New England: Rub the ticks over with a stiff brush dipped in hot soap-suds. When clean, lay them on a shed, or any other clean place, where the rain will fall on them and drench the feathers. When thoroughly soaked, let them dry in a hot sun and wind for six or seven successive days, shaking them up well, and turning them over each day. They should be covered over with a thick cloth during the night; if exposed to the night air they will become damp and mildew. This way of washing the bed-ticking and feathers, makes them very fresh and light, and is much easier than the old-fashioned way of emptying the beds, and washing the feathers separately, while it answers quite as well. Care must be taken to dry the bed perfectly before sleeping on it.

Dyeing.—It is essential that articles to be dyed should be perfectly clean; if they be dirty or greasy, the color will be likely to rub off. Iron vessels are best for dark dyes, and brass or copper vessels for light ones. The dye should be carefully strained and clear, and the articles wet in soft water before dipping. The cloth should be well soaked and frequently lifted up and down in the kettle. If, on removing it, the color be too light, dry and immerse again; meantime, adding more of the dyeing compound if the solution requires. The dye should not be crowded with goods so as to

hinder them from being moved in it and kept under without difficulty. When goods are first put in the dye, they should be kept moving in it for at least twenty minutes, so that they will color even.

The best way to fix yarn for coloring is to put the skeins on sticks made out of pine an inch or so in diameter, and from a foot to a foot and a half long, according to the size of the kettle. Cut some notches near each end of the sticks, then tie strong cords in the notches at one end. The cords should be about six inches longer than the sticks; put the yarn on the sticks and tie the cords at each end, then you can handle the yarn in the dye without getting it tangled.

Remove any previous color by boiling in a soda washing-fluid.

Black.—Dissolve six ounces sulphate of copper (blue vitriol) in a kettle of water, heated to nearly a boiling point; then run in your yarn, or flannel, forty-five minutes; take it out and rinse well in cold water; empty your kettle, put in fresh water, add three pounds of logwood, and a half pound of madder, boil well, cool with a little cold water, run in your goods one hour; then cool, boil your dye well, and run in one hour more. If too blue, add a little madder; if too brown, add more logwood; run in again, and you will have a good black that will neither fade nor crack. The above is for ten pounds of yarn, ten yards of fulled cloth, or fifteen yards of flannel. Wash well before and after coloring.

Yellow.—Simmer your hanks of yarn in strong alum-water; then put a layer of peach-tree leaves in a tub, then a layer of yarn, then leaves, till all are in; then pour over them the boiling-hot alum-water to cover them. Let it set all night; wring out and air it; then heat the dye and put in fresh leaves with the same yarn, in layers, and pour over the hot dye for several days. Wring it each day till you get it the shade you like. Set it with strong suds. This makes a fast color, that grows brighter by washing in strong suds.

Fustic, tumeric powder, saffron, barberry bark, and marigold flowers are each somewhat used for this color.

Orange.—Boil the skins of ripe onions half an hour; take out the skins, and add one ounce of alum to one quart of dye; put in the silks or woollens and stir often for half an hour; dry, wash, and iron quite damp. Black alder, set with lye, also makes an orange.

Red.—Half a pound of wheat bran, two gal-

lons of soft water, and three ounces powdered alum boiled in a brass vessel. Add an ounce each, of cream of tartar and cochineal, tied in a bag. Boil for fifteen minutes, strain, and dip the articles.

Or, take one pound of madder for every two pounds of yarn, or cloth; soak the madder in a brass or copper kettle one night in warm water, enough to cover the yarn you wish to color; next morning put in two ounces of madder compound for every pound of madder you have soaked, then wet your yarn or cloth in clean water and wring it out; afterward put it in the dye; now put the kettle on the fire and bring it slowly to a scalding heat, which will take half an hour; keep it at this heat about half an hour, if a light red is wanted, and longer if a dark one, the color depending upon the time it remains in the dye. When the color is made, rinse the cloth immediately in cold water, and it will then be finished.

Blue.—For dark blue, boil two gallons of water with four ounces of copperas stirred in. Dip the articles; then, before they are dry, dip in a strong decoction of logwood, boiled and strained. Wash thoroughly in soap-suds.

For light blue, use the "blue composition;" sixty drops to a gallon of soft water. Dip and rinse thoroughly.

An exchange asserts that yarn, plain or mixed, can be colored a firm blue, even superior to that attained with indigo, by mixing common purslane macerated fine, and boiled for some hours with logwood chips, in the proportion of half a bushel of the former and a quarter of a pound of the latter. Two ounces of alum is used as a mordant for every pound of purslane.

Pink.—Buy a saucer of carmine at the apothecaries and follow directions that accompany it. Bergamot blossoms with a little cream of tartar in the water, are somewhat used.

Green.—Mix yellow and blue in some convenient way. It is usual to color first in yellow, then dip into blue.

Nankeen.—Boil equal parts of annatto and common potash in water, till dissolved. This will produce the pale-reddish buff so much admired.

Buff.—Tie a tea-cupful of potash in a bag and put in two gallons of hot (not boiling) water; add an ounce of annatto in another bag. After half an hour put in the article, having first moistened it with strong potash water. Dip and rinse in soap-suds. Buff also results from birch bark and alum.

Dove and Slate.—A tea-cupful of black tea

and a tea-spoonful of copperas, boiled in an iron vessel, properly diluted, make dove and slate of all shades.

Olive.—Fustic and yellow bark boiled together and set with copperas, make a good olive.

Silver Gray.—Wool may be dyed a silver-gray color by boiling for half an hour in a bath composed of four ounces glauher salts; four ounces sulphuric acid; iodine violet according to the shade desired; and a small portion of indigo and carmine. This mixture will be sufficient to dye ten pounds of the wool.

The Toilet.—We shall not, under this head, indulge in an elaborate treatise on dress, but offer to the reader some directions and recipes for a proper care of the person. We venture, however, to invade the empire of fashion, so far as to copy the following from the *Central Baptist*:

“Wearing Mourning.—We long for the day when this custom shall be obsolete. It is unbecoming the truly afflicted one. The wearer says by the black garments, ‘I have lost a near friend; I am in deep sorrow.’ But true grief does not wish to parade itself before the eyes of the stranger; much less does it assert its extent. The stricken one naturally goes apart from the world to pour out the tears. Real affliction seeks privacy. It is no respect to the departed friend to say we are in sorrow. If we have real grief it will be discovered.

“When God has entered a household in the awful chastisement of death, it is time for religious meditation and communion with God on the part of the survivors. How sadly out of place then are the milliner and dressmaker, the trying on of dresses and the trimming of bonnets. There is something profane in exciting the vanity of a young girl by fitting a waist, or trying on a hat, when the corpse of a father lies in an adjoining room. It is a sacrilege to drag the widow forth from her grief, to be fitted for a gown, or the selection of a veil.

“It is often terribly oppressive to the poor. The widow left desolate with a half-dozen little children, the family means already reduced by the long sickness of the father, must draw on her scanty purse to buy a new wardrobe throughout for herself and children, throwing away the good stock of garments already prepared, when she knows not where she is to get bread for those little ones. Truly may fashion be called a tyrant, when it robs the widow of her last dollar.

“Surely your sorrow will not be questioned, even if you should not call in the milliner to help you display it. Do not, in your affliction help uphold a custom which will turn the afflictions of your poorer neighbor to deeper poverty, as well as sorrow.”

There may be added another reason for dispensing with “mourning goods” quite as important as any of the above. Death is never a permanent separation of loving ones, but only a new and higher birth of the soul that goes before. Crape might be appropriate to express annihilation or endless misery, but in this enlightened age, flowers seem more becoming to decorate the portals of immortal life.

Bathing.—Not only the laws of health, but the conditions of personal neatness require that the whole human body should be bathed or sponged all over very often. There is scarcely anything that is so conducive to long life. The skin is chiefly composed of a close interlacing of minute nerves and blood-vessels, so compact that a needle’s point can not find room between them. There is more nervous matter in the skin than in all the rest of the body united, and its pores throw off more than a pound of waste matter every twenty-four hours. It is constantly exhaling insensible perspiration, and if this be not removed, the follicles become closed, and disease is likely to ensue.

The Hair.—We have the following apparently excellent advice from HALL’s *Journal of Health*: “As to men, we say, when the hair begins to fall out, the best plan is to have it cut short, give it a good brushing with a moderately stiff brush, while the hair is dry; then wash it well with warm soap-suds; then rub into the scalp, about the roots of the hair, a little bay rum, brandy, or camphor water. Do this twice a month; the brushing of the scalp may be profitably done twice a week. Dampen the hair with water every time the toilet is made. Nothing is better for the hair than pure soft water, if the scalp is kept clean in the way we have mentioned. The use of oil or pomatums, or grease of any kind, is ruinous to the hair of man or woman. We consider it a filthy practice, almost universal though it be, for it gathers dust and dirt, and soils whatever it touches. Nothing but pure soft water should ever be allowed on the heads of children. It is a different practice that robs our women of their most beautiful ornament long before their prime.”

Poisonous Hair “Restorers.”—At the present time there is quite a rage for the use of hair

"washes," or "restorers," which, while the charge of their being "dyes" is indignantly repudiated, yet in a short time "restore" the color of the hair. The active agent in these washes is, of course, lead. In the majority of cases, probably, a moderate use of such a lotion would be unattended with mischief; but it is worth remembering, that *palsy has been known to be produced* by the long-continued use of cosmetics containing lead, by persons of an extreme susceptibility to the action of poison.

The *Journal of Chemistry* mentions several cases, in which total or partial paralysis has thus been induced. There are thirty or more different makers of the article throughout the country, and as many different names given it. It may be known by the heavy sediment which is usually present in the bottles and which requires to be shaken up with the liquid portion before using. The "lead comb" advertised, is for similar reasons, objectionable.

Glycerine, perfumed with rose water, imparts to the hair a soft, silky brilliancy. People who will use pomades must be careful that they do not contain injurious coloring matter. The roseate pomades are always harmless in this respect.

Having prefaced with good advice, we add a variety of recipes.

Hair Restorative.—The following will generally restore gray hair to its natural color, but it is frequently poisonous, as above indicated: 1. Put one ounce of lac sulphur and one ounce of sugar of lead into a quart of pure alcohol; shake well and use.

2. (An instantaneous dye.) No. 1.—Mix one-half dram gallic acid with four ounces alcohol.

No. 2. Mix one dram crystallized nitrate of silver; one ounce of water; twenty drops spirits of hartshorn.

Previous to applying, the head and hair should be thoroughly cleansed with warm soapsuds, or a shampooing mixture. When nearly dry apply No. 1 to every part of head and hair, with hands or sponge, and while wet apply No. 2 with tooth-brush and comb. A pair of old gloves should be worn when No. 2 is applied, to keep the dye off the hands; India rubber gloves are well adapted for the purpose.

3. Put equal quantities of rum and sweet oil into a bottle, and before using, shake them well together. This mixture should be applied with a soft brush to the roots of the hair every night; it should be tried for a month at least, before any improvement can be expected.

Fresh beer also tends to prevent the hair from falling, but it is apt to leave it dry.

There is nothing better to restore faded hair than a wash of strong black tea.

To Dye the Hair Flaxen.—Take a quart of lye, prepared from the ashes of vine twigs, briony, celandine roots, and turmeric, of each, one-half an ounce; saffron and lily roots, of each two drams; flowers of mullein, yellow stechas, broom, and St. John's wort, of each a dram. Boil these together, and strain off the liquor clear. Frequently wash the hair with this fluid, and it will change it, we are told, in a short time to a beautiful flaxen color. It is always vulgar to try to change the natural color of the hair, for there is a correspondence between hair and complexion which is violated by such tampering.

Rose Pomatum.—Take half a pound of beef marrow and half a pound of fresh lard; melt them together, and stir in half a pint of castor or sweet oil. Have a gill of alcohol in which an ounce of alkanet root has been kept for two or three days. Strain this into the mixture to give it a crimson color. Perfume with oil of roses.

Good Hair Oil.—Perhaps the very best oleaginous hair application consists of a mixture of castor oil and alcohol, two parts by measure of the former, to one of the latter, the whole perfumed according to taste. The circumstance should here be mentioned that castor oil is the only oil that alcohol will dissolve.

Glycerine Hair Tonic.—Glycerine, bay rum, each one ounce; tincture cantharides, half-ounce; rose water, four ounces; aqua ammonia one-fourth ounce; mix. This tonic will often stop the hair falling off, will effectually remove dandruff, and, as a dressing, will far surpass any of the pomatums or greasy preparations in use.

Shampooing or Cleaning Mixture.—Half an ounce of borax dissolved in a pint of hot water. This is the wash generally used by hair-dressers.

Another and undoubtedly far superior way to clean the head and hair, is to use the whites of one or two eggs, which should be washed out of the hair with warm water. The hair will be left soft and silk-like, while the borax will make the hair rough and coarse, and require so much oil as to soon get dirty again.

Curling the Hair.—At any time, ladies may make their hair curl the more easily by rubbing it with the beaten yolk of an egg, washing it off afterward with clear water, and then putting

on a little pomatum before they put up the curls. It is well always to go through this process on changing to curls, after having worn the hair plain.

Bandoline.—This article, intended to keep the hair stiffly in place, is not much used during the present predominance of friz, but the whirling of fashion may restore the plastering custom before our book is out of press. Therefore:

Mucilage of quince-seed is used; mucilage of picked Irish moss, carefully strained is said to answer still better. Flax-seed tea is also somewhat resorted to.

To Remove Superfluous Hair.—Caustic, or quicklime, will certainly destroy hair; but when the hair is growing upon the human skin, it requires both patience and careful application, in consequence of its action upon the skin. Take a piece of the best lime about two ounces weight, put it into a saucer, and pour on it boiling water till it slakes; spread the paste thickly over the hair to be removed, and let it remain till no longer bearable. Then take an ivory or bone paper-knife, and imitate the process of shaving; finally, wash the part, and apply a little rose cold-cream to allay any irritation of the skin. If this be not effectual by one operation, the process must be repeated next day, even to a third operation if the hair be strong or black. A more effectual depilatory consists of lime slaked to powder, three ounces; orpiment (sulphuret of arsenic), half an ounce; well mixed and made into a paste with water, and applied as the above. This preparation must, of course, never be used but with extreme caution. However, if there be any irritation of the skin, the application of cold-cream will remove it in a few hours.

Cleansing Hair Brushes.—Saleratus and soda are considerably used in the water, but they are apt to injure the brushes. It is best to use a solution of ammonia or borax with lukewarm water, afterward rinsing in clean water.

The Teeth.—Children should not be permitted to neglect their teeth for a day; they should be habitually and frequently cleansed, not only as a needful preservative, but to promote an agreeable appearance, and to sweeten the breath. The saliva deposits tartar on the teeth, which destroys the enamel, and the teeth then rapidly decay.

One other caution is necessary; always buy a soft brush, and never use it oftener than once a day. Many have destroyed their teeth by incessantly scrubbing them with charcoal, ashes, and other coarse powders. All tooth powders

should be applied gently, and with great care. To keep the teeth clean is all that is required.

To Beautify the Teeth.—Dissolve two ounces of borax in three pints of boiling water, and before it is cold add one tea-spoonful of the spirits of camphor, and bottle for use. A table-spoonful of this, mixed with an equal quantity of tepid water, and applied daily with a soft brush, preserves and beautifies the teeth, extirpates all tartarous adhesion, arrests decay, induces healthy action of the gums, and makes the teeth pearly white.

Orris Tooth Powder.—Powdered orris root, one ounce; powdered myrrh, half an ounce; prepared chalk, eight ounces; powdered castile soap, one dram; oil of lemon, fifteen drops; mix and put through a fine sieve. This makes a soft and excellent powder.

Orris Tooth Paste.—Take four ounces each pulverized orris and rose pink; prepared chalk, two ounces; oil of cloves, five drops; mix with honey enough to form a paste of proper consistence.

Orris Tooth Wash.—Take pulverized orris, four ounces; myrrh, one ounce; galls, half an ounce; mix with two quarts of proof spirit. Let it stand for two weeks, frequently agitating it, and then filter and bottle for use.

For Chapped Hands.—1. Wash with soap and water with a table-spoonful of Indian meal, using the meal until the hands are dry. Then wet with pure glycerine water and dry at the fire.

2. Mix a quarter of a pound of unsalted hog's lard, which has been washed in common, and then in rose water, with the yolks of two new-laid eggs, and a large spoonful of honey. Add as much fine oatmeal or almond paste as will work into a paste. Use often.

Wash for the Face.—1. A learned chemist gives the following recipe for making a harmless, useful, and cheap wash: "A piece of gum tolu the size of a walnut, thrown into a wash-bowl of soft water, half an hour before using, will soften the skin, and after a few applications, will remove, to a great extent, tan, freckles, and roughness. The tolu imparts to the water an agreeable aromatic odor. Ten cents worth of this, with a cake of fine soap freely used, will be more effectual in beautifying a young lady's complexion than many costly and injurious cosmetics. The tolu may be kept in a china cup, and when used, the cup can be placed in the bowl of water, thus avoiding the trouble of removing the gum."

2. Tan may generally be removed from the

face by mixing magnesia in soft water to the consistency of paste, which should then be spread on the face and allowed to remain a minute or two. Then wash off with castile soap-suds, and rinse with soft water.

To Cure Freckles.—Take two ounces of lemon juice, a half-dram of powdered borax, and one dram of sugar. Mix together, and let them stand in a glass bottle for a few days; then rub it on the hands and face occasionally.

Diluted corrosive sublimate, with the oil of almonds, is sometimes used, and is a certain remedy, but somewhat dangerous.

To make Cold Cream for Cosmetic.—Take two ounces oil of almonds, half an ounce of spermaceti, one dram white wax; melt together, and add two ounces rose water, and stir it constantly until it is cold.

To Blacken the Eye-Lashes.—The simplest preparations for this purpose are the juice of elder berries, burnt cork, and cloves burnt at the candle. Some employ the black of frankincense, resin, and mastic; this black, it is said, will not come off with perspiration.

Breath Tainted by Onions.—Leaves of parsley eaten with vinegar will prevent an offensiveness of breath after eating onions.

The Nails.—To preserve and beautify the finger nails requires some skill and considerable attention. The nails are placed at the extremities of the fingers and toes to cover and protect from injury the numerous sensitive nerves of touch. The nails of the fingers, when well formed, contribute greatly to the symmetry of the hand. They constitute in the lady an important feature of personal attraction. According to European fashion, they should be of an oval figure, transparent, without specks or ridges of any kind; the semi-lunar fold, or white half-circles, should be fully developed, and the pellicle or cuticle, which forms the configuration around the root of the nail, thin and well defined, and when properly arranged, should represent, as nearly as possible, the shape of a half filbert.

Properly to arrange the nails is to cut them of an oval shape, corresponding with the form of the finger. They should not be allowed to grow too long, as it is difficult to keep them clean, nor too short, as it allows the end of the finger to become flattened and enlarged by being pressed upward against the nails and give them a clumsy appearance. The epidermis which forms the semi-circle around and adheres to the nail, requires particular attention, as it is frequently dragged on with its growth, drawing

the skin below the nail so tense as to cause it to crack and separate into what are called ag-nails. This is easily remedied by carefully separating the skin from the nail by a blunt, half-round instrument.

The nails should be cleansed with a brush, not too hard, and the semi-lunar skin should not be cut away, but only loosened, without touching the quick, the fingers being afterward dipped in tepid water, and the skin pushed back with a towel. This method should be practiced daily. It will keep the nails of a proper shape, prevent ag-nails, and the pellicle from thickening or becoming ragged. The biting or picking of the nails is an unfortunate and pitiful habit, which can seldom be prevented, and frequently continues for life.

There are sometimes white specks upon the nails, called *gifts*. These may be removed by the following preparation: Melt equal parts of pitch and turpentine in a small vessel; add to it vinegar and powder of sulphur. Apply this mixture to the nails, and the spots will soon disappear. Pitch and myrrh, melted together, may be used with equal success.

To whiten the nails: Diluted sulphuric acid, two drams; tincture of myrrh, one dram; spring water, four ounces; mix. First cleanse with white soap, and then dip the fingers into the mixture.

To prevent nails growing down into the toes: Take a sharp-pointed knife, and cut a little furrow all along the top of the nail lengthwise. As it fills up scrape it out again. This will cause the nail to contract at the top, and so loosen its hold from the flesh. Persevere until the difficulty is entirely overcome.

To Make Cologne Water.—Put into a pint of alcohol one dram each of the oils of lavender, lemon, rosemary, and burgamot, and eight drops each of the oils of cloves and cinnamon.

To Make Rose Water.—1. The following recipe will make rose water far preferable to the distilled article, either for a perfume or for culinary purposes. Otto of rose, twelve drops; rub it up with half an ounce of white sugar and two drams carbonate magnesia; then gradually add a quart of water, and two ounces of proof spirit, and filter through paper.

2. Take two pounds of rose leaves, place them on a napkin tied around the edges of a basin filled with hot water, and put a dish of cold water upon the leaves; keep the bottom water hot, and change the water at the top as soon as it begins to grow warm. By this kind of distillation you will extract a great quantity

of the essential oil of the roses by a process which can not be expensive, and will prove very beneficial.

To Make Lavender Water.—Take one ounce of oil garden lavender, and add thirty drops bergamot, twenty drops essence of musk, or ambergris, ten drops oil orange, eight drops otto rose; mix with two quarts proof spirit.

Milk of Roses.—Put into a small bottle two ounces of rose water, one tea-spoonful of oil of sweet almonds, ten drops of oil of tartar. Shake the bottle until the whole are combined. A beautiful cosmetic, to be applied with a corner of a towel or a cambric handkerchief, after the morning's ablutions.

Camphor Balls, for chapped hands, etc. Spermaceti, white wax, each half an ounce; almond oil one ounce; alkanet, to color. Melt, strain, and add three drams of powdered camphor.

Castor Oil Cream.—An agreeable and efficacious compound, rendering the skin pleasingly soft and delicate, and acting as a refreshing cosmetic after exposure to the sun, dust, or harsh winds, etc. Castor oil, one ounce; the best eau de cologne, one ounce; spermaceti, one ounce. Liquify the spermaceti, add to it castor oil, stir it up until it is reduced to a transparent liquid, remove it from the fire, and add, a little by little, eau de cologne, in stirring until it is cold.

Persian Sweet-Scent Bags.—Take one ounce lavender flowers; two drams pulverized orris; half ounce bruised rosemary leaves; five grains musk; five drops otto of roses; mix all well; sew up in small flat muslin bags, and cover them with fancy silk or satin, when they will be ready for use.

Antidote to Perspiration Odor.—The unpleasant odor produced by perspiration is frequently the source of vexation to persons who are subject to it. Nothing is simpler than to remove this odor much more effectually than by the application of such onguents and perfumes as are in use. It is only necessary to procure some of the compound spirits of ammonia, and place about two table-spoonful in a basin of water. Washing the face, hands, and arms with this, leaves the skin as clean, sweet, and fresh as one could wish. The wash is perfectly harmless, and very cheap. It is recommended on the authority of an experienced physician.

Household Pests.—When it is remembered how many persons have lost their lives by swallowing in mistake mixtures of strychnine,

nine, ratsbane, corrosive sublimate, etc, which are usually employed for this purpose, it will seem best to use, as far as possible, means of defense against insects and other pests that are not a deadly poison to man. Kerosine, so well known as a detergent, has been recently tried on a number of insects and has generally proved an efficient repellant. It is cheaper and of more ready access than some of the remedies given in this article, and is well worthy of trial in all cases where it can be conveniently applied. It is said that "two drops of benzine are sufficient to suffocate the most redoubtable pest, be it beetle, cockchafer, spider, slug, caterpillar, or other creeping thing. Even rats and mice decamp from any place sprinkled with a few drops of benzine. A singular fact connected with this application of benzine is, that the bodies of insects killed by it become so rigid their wings, legs, etc., will break rather than bend, if touched."

Ants.—The following serves as a very effective ant-trap: Procure a large sponge, wash it well, and press it dry, which will leave the cells quite open; then sprinkle over it some fine white sugar, and place it near where the ants are most troublesome. They will soon collect upon the sponge, and take up their abode in the cells. It is then only necessary to dip the sponge in scalding water, which will wash them out dead by ten thousands. Put on more sugar, and set the trap for a new haul. This process will soon clear the house of every ant, uncle, and progeny—if it is perseveringly followed up. Ants may also be numbered among the "can't-get-aways" by trapping them in a plate of lard.

Camphor is very offensive to ants, and indeed to all house insects. They also dislike sage, and will not cross a barricade of sage leaves on a shelf. Oil of cedar and turpentine, mixed, equal parts, in a bit of cotton, will scatter them "not for a day only, but for all time." Salt rubbed on shelves is also a defense against ants.

Bed-Bugs.—This nocturnal prowler is no more attractive, when we christen him in Latin, "*cimex lectularius*." Washing a bedstead thoroughly with a strong decoction of salt and water, filling the cracks with salt will generally banish these night-walkers that play so many tricks upon travelers.

Benzine will expel them, and is the main reliance of thousands of housewives. It is, however, less cleanly than some other washes.

Soap suds, laid on with a brush, is another repellant. So is a wash of strong alum water, applied hot.

One of the afflicted recommends concentrated lye as "better than salt" for a wash and insecticide. Another rises triumphant from the contest with the following: "As to bed-bugs, we would say, that quicksilver beaten into fine globules in the white of an egg and applied in their hiding-places, is the only sure and permanent remedy. It will remain for years and kill every bug and keep them killed."

Cock-Roaches.—The cock-roach (Croton bug in New York), is a disgusting guest, but is not very hardy or difficult to expel. The most simple and effectual relief is *finely powdered borax*. Sprinkle it freely into the crevices, and about hot-water pipes, where the roaches inhabit. You will find they will all leave. To make it effectual its use should be continued for a few weeks, renewing it every few days. It will not fail.

Another equally sure means of expulsion is in cucumber peelings, spread on the floor, shelf, or sink where they frequent. They will eat voraciously for two or three nights, and vanish forever.

Other poisons may be made by mixing gypsum with double the quantity of oat meal; or by compounding equal quantities of red lead, Indian meal, and molasses to the consistency of a paste.

Also try kerosine.

Fleas and Vermin may be got rid of on dogs by bathing in a strong infusion of lobelia for two or three mornings, and afterward washing with soap and water.

Flies.—Cleanliness is the most effectual defense against house-flies. If no food is left exposed, there is nothing to entice the swarms and furnish them with the means of subsistence. Keep the floor, shelves, tables, and vessels clean, and carefully cover and put away every article of food, and flies will never become very numerous on the premises. It is hardly possible to keep a house so immaculately neat but that a few flies may be expected; these should be carefully driven out every day, and the window-blinds be drawn together during the brightest sunshine.

Flies may generally be driven from a room by hanging up a bunch of plaitain or flea-wort plant after it has been dipped in milk. A wash, with a decoction of walnut leaves, is perhaps better, as it will expel without first enticing.

It is stated that strong tea, well sweetened, is death to flies.

Another poison, more instantaneous, is compounded of arsenate of potassa, two ounces; red lead, half an ounce; sugar, ten ounces; mix. Put a small quantity on a plate, and moisten with water.

The following simple mixture we can vouch for, as one of the best destroyers of the house-fly: Take equal portions of fine black pepper, fresh ground, and sugar, say enough of each to cover a ten-cent piece; moisten, and mix well with a spoonful of milk (a little cream is better); keep that in your room, and you will keep down your flies. One advantage over other poisons is that it injures nothing else; and another, that they never die in the house, but seek the air through open windows.

To protect from fly-specks: Boil three or four onions in a pint of water. Then, with a gilding brush, go over your glasses and frames, and the flies will not light on the article washed. This may be used without apprehension, as it will not do the least injury to the frames.

Moths.—These insects are very hardy, and never "die in aromatic pain." The miller is impelled by the strongest instinct to perpetuate her species, and no trifling impediment of cedar closets, or bits of cigar boxes, or even tobacco, will intimidate her. Benzine will restrict her movements; so will turpentine; so will carbolic acid. Camphor is, perhaps, more used than anything else, and is effective—probably the best thing to expel moths when they are once in possession.

The preservation of furs is perfectly simple. When their Winter service is finished (say in April), give them a good beating, shake them well, put a bit of camphor in, sew them up tight in a cotton or linen bag, and hang the bag high in wood-house or garret.

The cloth lining of carriages can be secured by washing or sponging with a solution of corrosive sublimate of mercury in alcohol, just strong enough not to leave a white stain on a black leather.

Moths can be got out of carpets by a thorough beating, and kept out by use, or by passing a hot iron over a piece of muslin, laid on the carpet after being soaked in a solution of two ounces of camphor well cut in a quart of whisky. Upholstered furniture should be frequently taken out and whipped.

Musketoos.—Good pennyroyal is a defense against these sanguinary serenaders. Camphor

is also a powerful agent to drive them away, when it is hung up by the casement in a bag, or, as a liquid, suspended in a sponge over the bed. Camphorated spirits applied as a perfume to the face and hands will act as an effectual preventive; but, when bitten by them, aromatic vinegar is the best antidote.

Rats and Mice.—CARLYLE says that when the Maker looked upon a rat and found he had made a mistake, he called the cat into being as an antidote. Like the honey-bee, the rat is one of the advance-guards of civilization, and, quite unlike the honey-bee, he is one of the most impudent, thievish, and mischievous wretches that ever infested the habitations of man.

One good cat is worth a dozen traps and any quantity of arsenic and corrosive sublimate. The old-fashioned box-trap, open at both ends, is one of the best traps. A Connecticut man says his way of driving rats from his premises is to catch one, dip it in red paint, except the head, and let it go again.

Then there are various *internal* mechanical contrivances: Cork or sponge cut up and sweetened, which swells up within the victim and kills him; also, glass, ground or pounded fine, and mixed with equal parts of flour and meal, and flavored with a few drops of anise; or unslaked lime mixed with meal, which makes the eater intensely thirsty, and when he drinks causes him to explode.

There are various things warranted to kill rats or drive them away, thus; Wild pepper-mint will (sometimes) keep them from barns and granaries; they have an aversion for yellow ocher, for a solution of copperas, and for chloride of lime. Rats and mice speedily disappear by mixing equal quantities of strong cheese and powdered squills.

Poisons may be prepared thus; Take a bunch of matches and soak them over night in a teacupful of water; then take out the matches, thicken the water with Indian meal to a stiff dough, adding a tea-spoonful of sugar and a little lard; lay it about the premises where the rats and nothing else will get it. "Mix two ounces of carbonate of barytes with one pound of suet or tallow, and place portions of the mixture within the holes and about the haunts of the rats. It is greedily eaten, produces great thirst, and death ensues after drinking. This is a very effectual poison, because it is both odorless and tasteless." Where there are children, poisons must be used with great care.

The Care of Utensils, etc.—One piece of iron, a nut, or a pipe, screwed upon another, can be removed when rusted by the application of heat by an iron or wet cloth, to the outer section. Ground stoppers may be removed from bottles by cooling the stopper, and heating the neck of the bottle.

An Iron Dish-Cloth—Is, undeniably a good thing. They are in common use in Europe, especially for pots and kettles, but are little known in this country. They are each made of some two hundred little iron rings, number fifteen, linked together, and are about six or eight inches square, looking somewhat like chain-armor. They are very flexible. Every kitchen maid who has scoured the inside or outside of a kettle with one pronounces it far better than scraping with a knife and scouring with cloth and sand. It is also very useful to put under anything hot from the stove. Of course, the iron dish-cloth is well-nigh indestructible.

To Repair a Looking-glass.—To repair the silvering on the back of a looking-glass, clean the bare portion of the glass, by rubbing it gently with fine cotton, taking care to remove any trace of dust and grease. This cleaning must be done very carefully, or defects will appear around the place repaired. With the point of a knife cut upon another looking-glass around a portion of the silvering of the required form, but a little larger. Upon it place a small drop of mercury, the size of a pin's head for a surface equal to the size of your nail, the mercury spreads immediately, penetrates the amalgam to the point where it was cut off with the knife, and the required piece may now be lifted up and removed to the place to be repaired, very carefully; press lightly the renewed portion with cotton; it hardens almost immediately, and the glass presents the same appearance as a new one.

To Clean Glass.—To clean looking-glasses or window-panes, rub with clean paper moistened, then with dry paper. A still better way is, apply whiting and rub with chamois skin.

To Freshen Gilt.—Alum and common salt of each one ounce, purified niter two ounces, water one-quarter of a pint. This much improves the color of gilt articles, it being laid over them with a brush.

To Clean Paint.—Smear a piece of flannel in common whiting mixed to consistency of paste in warm water. Rub the surface to be cleaned quite briskly, and wash off with cold

water. This will leave a clean and bright surface.

To Remove Marks from Tables.—Hot dishes sometimes leave whitish marks on varnished tables when set, as they should not be, carelessly upon them. For removing them, pour some lamp-oil on the spot, and rub it hard with a soft cloth. Pour on a little spirits and rub it dry with another cloth, and the white mark will disappear, leaving the table as bright as before.

To Clean Clocks.—"Common brass clocks may be cleansed by immersing the works in boiling water. Rough as this treatment may appear, it works well, and I have for many years past boiled my clocks, whenever they stop from any accumulation of dust or thickening of oil upon the pivots. They should be boiled in pure rain water and dried on a warm stove or near the fire. I write this by the tick of an eight-day clock, which was boiled a year ago, and has behaved perfectly well ever since."

To Clean Marble.—Never wash marble mantels and tables with soap-suds—the potash of the soap decomposes the carbonate of lime, and in time destroys the polish. To clean marble, take two parts of common soda, one part of pumice-stone, and one part of finely-powdered chalk; sift it through a fine sieve, and mix it with water; then rub it well all over the marble, and the stains will be removed; then wash the marble carefully, and it will be as clean as ever. To remove iron stains from marble: Take an equal quantity of fresh spirit of vitriol and lemon-juice, being mixed in a bottle, shake it well; wet the spots, and in a few minutes rub with soft linen till they disappear.

Removing Putty from Sash.—Great difficulty is frequently experienced when glass is accidentally broken, in removing the old putty to replace the pane. Moisten the putty with nitric or muriatic acid, and it may be removed at once. Where these can not be had, vinegar or strong soap laid upon the putty will in a few hours loosen it from the wood so that the new glass can be set without difficulty. The application of a hot iron will also soften it.

To Clean Gold Chains.—Put the chain in a small glass bottle, with warm water, a little tooth-powder, and some soap. Cork the bottle and shake it for a minute violently. The friction against the glass polishes the gold, and the soap and chalk extract every particle of grease and dirt from the interstices of a chain of the most intricate pattern. Rinse it in clear cold

water, wipe with a towel, and the polish will surprise you.

To Clean Brass.—Rub the surface of the metal with rotten-stone and sweet-oil, then wipe dry with a piece of cotton flannel and polish with soft leather. A solution of oxalic acid, or even vinegar, rubbed over tarnished brass with a cotton rag soon removes the tarnish, rendering the metal bright. The acid must be immediately washed off with hot water, and the brass rubbed with whiting, in powder, and soft leather. Camphene and rotten-stone also effects a brilliant and durable polish on most metals.

To Clean Plate.—The usual method of cleaning silver is with whiting, pulverized very fine and sifted through book-muslin, and made into a cream with alcohol—or spirits of wine, which is better. Spread the cream on the silver with a sponge, and lay the articles in the sun or at a little distance from the fire, to dry. Then dust off and polish with a buckskin or chamois skin.

German silver and britannia ware may be cleansed and burnished similarly; or sweet oil may be added to the above mixture.

To Clean Tin Ware.—Acids should never be employed to clean tin ware, because they attack the metal and remove it from the iron of which it forms a thin coat. We refer to articles made of tin plate, which consists of iron covered with tin. Rub the article first with rotten-stone and sweet oil, the same as recommended for brass, then finish with whiting and a piece of soft leather. Articles made wholly of tin should be cleaned in the same manner. In a dry atmosphere, planished tin ware will remain bright for a long period, but will soon become tarnished in moist air.

To Prevent and Remove Rust.—Polished steel articles, if rubbed every morning with leather, will not become dull or rusty; but if the rust has been suffered to gather, it must be immediately removed by covering the steel with sweet oil, and allowing it to remain on for two days; then sprinkle it over with finely powdered unslacked lime, and rub it with polishing leather.

To protect unused tools from rust: Take three pounds of lard and one pound of resin, melt them together in a basin or kettle, and rub them over all iron or steel surfaces in danger of being rusted. It can be put on with a brush or a piece of cloth, and wherever it is applied it most effectually keeps air and moisture away, and of course prevents rust. When knives and forks, or other household articles liable to become rusted or spotted, are to be laid away, rub

them over with this mixture, and they will come out bright and clean even years afterwards. The coating may be so thin as not to be perceived, and it will still be effectual. Let every one keep a dish of this preparation on hand. As it does not spoil of itself, it may be kept ready mixed for months or years.

Some persons employ an acid to remove rust from knives. This should never be done under any circumstances.

Scouring Knives.—A small, clean, raw potato, with the end cut off, is a very convenient article with which to apply brick-dust to knives for scouring purposes, keeping about the right moisture for the dust to adhere, while the juice of the potato assists in removing stains from the surface. A better polish can be got by this method than by any other, and with less labor. One of the best substances for cleaning knives is charcoal, reduced to a fine powder, and applied in the same manner as brick-dust is used. This is a recent and valuable discovery. Cork is preferred to the raw potato by some house-keepers.

To Remove Starch or Rust from Flat-Irons.—Tie up a piece of yellow beeswax in a rag, and when the iron is almost, but not quite hot enough to use, rub it quickly with the wax, and then with a coarse cloth.

To Clean Knife Handles.—When the ivory handles of knives get stained or turn yellow, mix a table-spoonful of water with a few drops of spirit of salt; rub it well on, wash it off with cold water and wipe perfectly dry.

To Toughen Glass.—Put the glass vessel into a vessel of cold water, and gradually heat the water boiling hot; then allow it to cool gradually of itself, without taking out the glass. Goblets treated in this way may, when cold, be filled with boiling water without cracking. Lamp chimneys may also be made tougher by this process.

Cement.—Home-made cement is probably better and certainly cheaper than that purchased at the stores. We give recipes for several kinds:

1. For a china or earthen dish: Bind the fragments carefully together, and put in warm milk fresh from a cow. Some find boiling in milk more effective.

2. Rub the edges of the broken ware with the well-beaten white of an egg. Take powdered quicklime and sift it thick over the edge rubbed with the egg, press and bind the pieces together, and let the binding remain several weeks.

3. Stir plaster of Paris into a thick solution

of gum-arabic, till it becomes a viscous paste. Apply it with a brush to the fractured edges, and draw the parts closely together. In three days, more or less, according to dryness and temperature of the air, it will be perfectly dry, and the article can not be broken in the same place. It is white and does not show.

4. Take a small quantity of isinglass and dissolve in spirits of wine, by the aid of heat. This will unite broken glass so as to leave the crack nearly imperceptible, and is equal to the best glass cement sold at the stores.

5. *Diamond Cement.*—White glue, four pounds; dry white lead, one pound; water, four quarts; alcohol, one quart. Boil the glue and the lead in the water until the glue is dissolved, stirring all the while. Let it cool, and when blood warm, stir in the alcohol until all is mixed. Pour into vials for use. This will join china, wood, leather, or glass.

Stove Cement.—When a crack is discovered in a stove, through which the fire or smoke penetrates, the apertures may be completely closed in a moment, with a composition consisting of wood ashes and common salt, made into paste with a little water, plastered over the crack. The good effect is equally certain, whether the stove, etc., be cold or hot.

Aquarium Cement.—"I have tried fifty different cements for an aquarium, and find the best composition is, one part common pitch, one-half part gutta-percha; they can be melted in a little turpentine. To make it work easier, there must be no coal oil in the turpentine, or the pitch will soften and be destroyed. You will find this mixture gives a little with the material that the tank is made of, as the changes of heat and cold affect it; and it will adhere to glass, wood, or iron."

A Cement for Roofs.—A cement which is a good protection against weather and water, and also fire, to a certain extent, is made by mixing a gallon of water with two gallons of brine, then stir in two and a half pounds of brown sugar, and three pounds of common salt; and put it on with a brush like paint.

White lead paint, with fine sand intermixed to stiffen it according to need, answers a good purpose to mend a leaky roof. Gas tar, or any kind of tar, similarly stiffened, will make an excellent water-proof, frost-proof application. Another, and a very good cement, is made of four pounds of resin, a pint of linseed oil, and an ounce of red lead, to be applied hot, with a brush.

Preserving Shingles.—Every farmer knows

that the cost of the roofs of his buildings, as well as keeping them in repair, is a large item in his expenditures. Experiments should be made to lessen this cost. We observe the following in a late paper: When putting on the roof, dip the shingles in a tub of whitewash made of lime and salt. Line with red chalk. The carpenter may get a little lime on his hands and linen pantaloons, but this difficulty is not a very formidable one. The lime will harden the wood, and prevent its wearing away, and will effectually exclude moss, a common hastener of decay. It is said that shingle roofs will last twice as long when treated in this way. Whitewashing each successive layer of shingles when laying down, is also a good preservative.

A Cheap Out-Door Paint.—Colonel JAMES BOYLE, of Annapolis, Maryland, an instructive writer on rural affairs, contributes a recipe for making cheap and good paint: "Having been so frequently applied to for the following recipe, until it has become troublesome to give copies of it, I send it for publication: To make paint without white lead and oil, take three quarts of skimmed milk, two ounces of fresh slaked lime, five pounds of whiting. Put the lime in a stone-ware vessel, pour upon it a sufficient quantity of milk to make a mixture resembling cream; the remainder of the milk is then to be added; and lastly the whiting is then to be crumbled and spread on the surface of the fluid, in which it gradually sinks. At this period it must be well stirred in, or ground as you would other paint, and it is fit for use.

"There may be added any coloring matter that suits the fancy. It is to be applied in the same manner as other paints, and in a few hours it will become perfectly dry. Another coat will then be added, and so on until the work is completed.

"This paint is of great tenacity, and possesses a slight elasticity, which enables it to bear rubbing, even with a coarse woolen cloth, without being in the least degree injured. It has little or no smell even when wet, and when dry is perfectly inodorous. It is not subject to be blackened by sulphurous or animal vapors, and it is not injurious to health. All which qualities give it a decided advantage over white lead. The quantity above mentioned is sufficient for covering seventeen square yards with one coat.

Another: Any quantity of charcoal, powdered, a sufficient quantity of litharge as a dryer, to be mixed smoothly with linseed-oil.

The above forms a good black paint; and by adding yellow ochre, an excellent green is produced, which is preferable to the bright green used by painters for all garden work, and does not fade with the sun. After fourteen years usage and out-door exposure, this paint has been found apparently as perfect as when first put on.

Paint to Endure.—Boiling coal tar with slacked lime, will make a shining surface on wood-work, and walls of any clay, or turf, which is as imperishable as stone; it is, therefore, better than all the paints in the world, for the outside work of these houses, and for wooden, water, and eaves troughs; and it has been proved that rough surfaces may be made in this way, as durable and hard as cast-iron, by using the dust from a smith's forge, over the tar, as soon as it is brushed on.

To Preserve Wood-Work.—The following is the mode of making a composition for preserving wood-work, given in YOUNG's *Culendar*, who says "it will preserve planks and boards for ages." It is easily made and applied, and its efficacy tested. Melt twelve ounces of resin in an iron pot, add three gallons of train oil, and three or four rolls of brimstone; when melted thin, add as much Spanish brown, or brown ochre, first ground fine, with as much oil as will give it the required color; lay it on with a brush as hot and thin as possible; and some days after the first coat is dry, lay on another.

Windows, Crystallized.—Dissolve Epsom salts in hot ale or solution of gum-arabic; wash it over the window, and let it dry. If you wish to remove any, to form a border or center-piece, do it with a wet cloth.

Selection and Cure of Brushes.—When selecting brushes, see that the handles are not loose, that the hair does not come out. Brushes are very apt to burst loose from the binding. Before using paint-brushes or white-wash-brushes, they should be placed with the hair end up, and some good varnish poured down against the butt end of the handle, which will spread among the hair and become so hard in a few days, that the hair and handle will be so firmly united as to prevent the bursting of the brush or shedding of hair. By turning a few spoonfuls of good varnish into a white-wash-brush, and by giving the leather band a good oiling, its durability will be increased sometimes more than one-half.

To Make Cabinet Ware Polish.—Take one gallon of strong alcohol, and put in it half a

pound of gum shellac, or more if it will dissolve. Add to it also one ounce of gum sandarac, one ounce gum mastic, and half an ounce of gum eluni. Dissolve by placing the bottle in warm water, or leaving it in the sun, and shaking it often through the day until it is dissolved.

To Make Excellent Varnish.—Take eight pounds finest African copal, fuse carefully; add clarified linseed oil, two gallons; boil gently for four and a half hours, or until quite stringy; cool a little, and thin with three and a half gallons rectified spirits turpentine.

Furniture Polish.—Take two ounces of beeswax, cut fine; spirits of turpentine, one ounce; one dram of powdered resin; melt at a gentle heat, and add two drams of Indian red to give it a mahogany color.

Varnish for Maps and Drawings.—Dissolve one pound of shellac, a quarter of a pound of camphor, and two ounces of Canada balsam in one gallon of alcohol.

Whitewashing.—Nothing attended with so little expense and trouble, does more toward beautifying a homestead than whitewash. Every farmer should see to it that in the Spring of the year his stables, garden-fence, and out-houses are whitewashed. It will always prove a satisfaction to him and his family during the Summer, and give a pleasant appearance to the eye of the passer-by. More particularly, for health and comfort, should the cellar, chicken-house, and inside of stable be thoroughly cleaned and whitened.

Whitewash is a purifying agent and a disinfectant, and the benefits conferred in this regard compensate for all the labor and expense involved in whitewashing; but the clean, tidy appearance which it gives to farm premises is most pleasing and salutary. In no way can a farmer make so imposing and even elegant a show for a trifling expenditure as by a free use of whitewash. Even old buildings glow and glisten under the whitewash brush, and assume a new appearance. Buildings, in the eye of the owner as well as those of his neighbors, have a higher money value after the process is completed.

The following is a good recipe for whitewash: Procure fresh-burnt lime—not that partly air-slaked. The large lumps are best; the fine portions and small lumps will not make a wash that will stick well. For this reason, lime that has been burnt several months, is not so good as that just from the kiln. Put a pound or two in a vessel, and pour on water slowly, until it is all slaked and is about as thick as cream; then add

cold rain water until it will flow well from the brush. Stir often when using it. A few drops of bluing added will give it a more lively color. One or two table-spoonsful of clean salt, and one-fourth pound of clean sugar to a gallon of the wash, will make it more adhesive. If the walls have been whitewashed, let them be swept thoroughly, and if colored with smoke, wash them clean with soap-suds. A brush with long thick hair will hold fluid best, when applying it overhead. If a person has the wash of the right consistence, and a good brush, he can whitewash a large parlor without allowing a drop to fall. When it appears streaked after drying, it is too thick, and needs diluting with cold water. Apply the wash back and forth in one direction, and then go crosswise, using a paint brush at the corners, and a thin piece of board to keep the brush from the wood-work, or the border of the paper.

Coloring matter may be mingled with the wash, to give it any desired tint. To make a light peach-blow color, mingle a small quantity of Venetian red. For a sky-blue, add any kind of dry blue paint, stirring it well while mixing. To make a wash of a light straw-color, mingle a few ounces of yellow ochre or chrome yellow. The coloring matter should be quite fine, to prevent its settling at the bottom of the vessel. A small quantity of green paint, and a little red, will form a desirable color for out-door work. The true way to blend colors is to take a small quantity of the wash in a vessel, and mix a little at once, marking the proportions of each kind. When buildings or fences are to be whitewashed, prepare the wash as directed above, keeping it warm when using it by means of a kettle of burning coal; and mingle about a pint of good paste made of wheat flour, with a gallon of the wash. A bushel of lime will make wash enough for a barn, or yard fence.

Brilliant Stucco Whitewash.—The following is the recipe for making the handsome whitewash used on the east end of the President's house, at Washington: Take half a bushel of nice unslaked lime, slake it with boiling water, cover it during the process to keep in the steam, strain the liquid through a fine sieve or strainer, and add to it a peck of salt previously well dissolved in warm water, three pounds of ground rice, boiled to a thin paste and stirred in boiling hot, half a pound of powdered Spanish whiting, and a pound of clean glue which has been previously dissolved by soaking it well and then hanging it over a slow fire in a small kettle within a large one filled with

water; add five gallons of hot water to the mixture, stir it well and let it stand a few days covered from the dirt. It should be put on hot. It is said that about a pint of this mixture will cover a square yard upon the outside of a house, if properly applied.

Liquid Glue.—The following recipe, the discovery of a French chemist, is selling about the country as a secret, for various prices, from \$1 to \$5. It is a handy and valuable composition, as it does not gelatinize nor undergo putrefaction and fermentation, and become offensive, and can be used cold for all the ordinary purposes of glue in making or mending furniture, books, or broken vessels that are not exposed to water, etc. In a wide-mouthed bottle dissolve eight ounces of best glue in half a pint of water, by setting it in a vessel of water and heating it till dissolved. Then add slowly, constantly stirring, two and a half ounces of strong aqua fortis (nitric acid). Keep it well corked, and it will be ready for use.

An excellent article of family glue can be made as follows: Crack up the glue and put in a bottle; add to it common alcohol (or vinegar will answer), shake up, cork tight, and in three or four days it can be used. It requires no heating; will keep for almost any length of time, and is at all times ready to use, except in the coldest of weather, when it will require warming. It must be kept tight, so that the alcohol will not evaporate, else it will become dry and hard. A little aqua fortis is sometimes added, to prevent the glue from hardening, when cool.

Paste.—Adhesive Paste, made of rye flour, wet up with strong beer, with a little alum added while it is boiling, is almost as strong as glue.

Adhesive Gum.—The gum used on envelopes and postage-stamps is a preparation of starch, called *dextrine*, and results from *scorching* rye-flour before wetting it up. When well made it is better than gum-arabic.

Lights.—If you burn gas, learn to read your own gas meter, and you will probably save a large fraction of your gas bill.

How to Save Kerosene Oil.—A Pennsylvania journal says; "A short time ago we published an article from an exchange to the effect that in a kerosene lamp was a great saving of oil. We have since fully tested it, and it is a greater saving than was stated in the article referred to. Fill the lamp half full of common salt, then fill up with oil. It burns with a clearer

flame, and it is a saving of more than twenty-five per cent. in oil. Try it."

To make Tallow Candles.—Take two pounds of alum for every ten pounds of tallow; dissolve it in water before the tallow is put in, and then melt the tallow in the alum water, with frequent stirring, and it will clarify and harden the tallow, so as to make a most beautiful candle.

Another: Very hard and durable candles are made in the following manner: Melt together ten ounces of mutton tallow, a quarter of an ounce of camphor, four ounces of bees-wax, and two ounces of alum. Candles made of these materials burn with a very clear light.

To make Candles in imitation of Wax.—1. Throw quicklime in melted mutton-suet; the lime will fall to the bottom, and carry along with it all the dirt of the suet, so as to leave it as pure and as fine as wax itself.

2 Now, if to one part of the suet you mix three of real wax, you will have a very fine, and to appearance, a real wax candle; at least the mixture could never be discovered, not even in the molding way of ornaments.

Inks.—**Cheap Black.**—Take one pound of logwood, one gallon soft water; boil slightly, or simmer in an iron vessel one hour; dissolve in a little hot water twenty-four grains bistir chromate of potash; twelve grains prussiate of potash, and into the liquid while over the fire; take it off and strain it through a fine cloth. This ink can be made for five cents a gallon, and it sells from one dollar to three dollars. It is of a bright jet black, flows beautifully from the pen, and it is so indelible that oxalic acid will not remove it from paper. No other ink will stand the test of oxalic acid; hence its value for merchants, banks, etc.

Indelible Ink.—This may be made much cheaper than purchased, as follows: Two drams of nitrate of silver, added to four drams of a weak solution of tincture of galls. Another: Nitrate of silver one dram, mixed with a solution of half an ounce of gum-arabic in half a pint of pure rain water. Moisten the cloth previously with a strong solution of pearl, or salt of tartar and iron it dry.

To Remove Indelible Ink Stains.—To remove indelible ink or nitrate of silver stains from white fabrics, wet the part with water, then apply tincture of iodine, which converts the nitrate into iodide of silver; then wash with a diluted solution of common caustic potash; then wash well with hot water and soap.

Ink for Secret Correspondence.—Dissolve muriate of ammonia in water, and write with it. The writing will be invisible. When you would make the writing appear, heat the paper by the fire, and the writing will become black and legible.

Care of Boots, Harness, etc.—Oils applied to dry leather almost invariably become rancid and injure it. It is better to wash the article in cast-steel soap-suds over night, and oil in the morning. Never use vegetable oils on leather; and of animal oils, neat's-foot is the best, applied with considerable elbow-grease. Nothing is better for ordinary protection from water. Thoroughly soaking in soft soap will restore boots and shoes that have been scorched.

Water-Proof Dressing for Shoes.—We give the following different preparations :

1. Take neat's foot oil, five ounces ; wax, one-half ounce ; Burgundy pitch, one-quarter ounce ; oil of turpentine, one-half ounce ; melt together and apply until the leather is saturated.

2. Suet, resin, beeswax, and lamp-black melted and applied.

3. A solution of India-rubber, two drams, and oil of turpentine, fifteen ounces ; mixed, when dissolved by heat, with one pint of boiled oil.

4. India-rubber, one part ; copal varnish, six parts ; turpentine, sixteen parts. Dissolve with a gentle heat ; then add beeswax, one part, previously dissolved in boiled oil, twelve parts ; lastly, add litharge, three parts. Boil a few minutes, and cool.

5. With twenty-one parts melted tallow mix three parts resin, and add to seven parts good washing-soap and seven parts rain-water, while boiling together.

6. Melt a pound each of tallow and resin ; mix and apply until neither the sole nor upper will soak any more. If it is desirous that the boots should immediately take a polish, dissolve an ounce of wax in a tea-spoonful of turpentine and lamp-black, and apply.

Shoe-Blacking.—Take four ounces of ivory-black, three ounces of the coarsest sugar, a table-spoonful of sweet-oil, and a pint of small-beer ; mix them gradually, cold.

Plaster of Paris, passed through a fine sieve, twenty parts ; brewer's malt, ten parts ; lamp-black, five parts ; and olive oil, one part. The malt must be first macerated in water nearly boiling ; the plaster and lamp-black are next mixed, in a basin, with the malt liquid, and

when evaporated to the consistence of paste, the olive oil is mixed with it. In place of plaster, potter's clay may be used, made fine. Oil of lemon is used to perfume it.

To make Varnish for Leather.—To ten quarts of alcohol, add one pound of black sealing-wax, one pint of Venice turpentine, and one pound of gum shellac.

Cleaning Saddles, etc.—The following is a good recipe which will give saddles and bridles a good polish and be entirely free from all stickiness:—The white of three eggs evaporated till the substance left resembles the common gum ; dissolve in a pint of gin, and put into a common wine bottle, and fill up with water.

Neat's Foot Oil and Glue.—A supply of neat's foot oil should be kept on hand in every house for use on harness, carriage-tops, boots, shoes, etc., and applied often enough to keep them soft and pliable. To prepare it, break and cut into small pieces the shin bones and hoofs of an ox or cow, and put them into a kettle. Keep them covered with water, and boil them until the oil is extracted and rises to the surface. While boiling, water enough should be added from time to time to supply that lost by evaporation, so that the oil shall not come in contact with the bones and be again absorbed. The process will be hastened by keeping the kettle closely covered to retain the heat. When cold, the oil may be dipped off, and kept in jugs or bottles, tightly corked.

After the oil is taken off, the water is strained to separate from it any fatty particles that may remain, and then it is boiled again, until, upon trying, it is found it will settle into a stiff jelly. It is then poured into flat-bottomed dishes, and when cold, cut into suitable sized pieces. It hardens in a few days, and you will then have a very fine article of glue, free from impurities of every kind, sufficient for family use for a twelve-month.

Beverages—Summer Drinks.—

Nothing but water is capable of satisfying thirst. Other drinks answer this purpose only in proportion to the quantity of this fluid they contain. Water, if pure, and only moderately cool, may be drank at all times with impunity, on condition that it be taken slowly, with an interval for breathing after every swallow. By sipping, or swallowing gradually, not only is all danger of over-drinking avoided, but the thirst is more promptly and thoroughly satisfied. Taken with such precaution, iced-water is the best of all Summer drinks.

Science and experience combine to condemn the use, particularly in hot weather, of all spirituous beverages, such as brandy, gin, and whisky. Of whatever use the carbon of alcohol may be in the cold of Winter, all agree in rejecting its compounds as Summer drinks. Indeed, it is probable that they are never useful as beverages, as they act upon the brain and nervous systems as direct poisons.

Wine.—If stimulants are at all required, genuine French wines are the best, because they are the purest and the lightest.

It has been truly said that wine is a thing not made by man at all, but only modified by him at most. It is a production of nature. In the purest and best grape wine, this fact is most remarkably exhibited. The grapes are easily pressed by a wine, or even cider-press, and can be kept separate from the lees, or allowed to ferment on them as strength is required. Not one drop of water, not even a lump of sugar is requisite if the grape is sufficiently sweet, though most of the wines in this country are made with both. The fermentation is all an act of nature herself. She it is who makes our wine, and all that men have to do while the fermentation is going on, in the juice, is to watch it and let it alone. And when the fermentation has ceased, the drawing off into a clean cask, and keeping it undisturbed in a dark cellar by itself, is all that man can do. A lump of loaf sugar in each bottle, when bottled, may give a champagne freshness to it, but the simpler, the purer, the less cookery in wine, the better for it and those who have the good taste to prefer it thus. The pure juice of grapes is best in sickness. The best of grapes, and if sugar be added, only the best and purest of sugar should be used.

We hardly grow any grape east of the Mississippi that yields wine that is palatable to our people generally, without sugar to supply the want of saccharine matter in the fruit. Portions of Missouri, Kansas, and the territory south-westward through New Mexico to California, produce considerable excellent wine. California and the adjoining States are becoming the vineyard of the continent, and will doubtless soon produce wines that for lightness and delicacy of flavor will rival the choicest wines of the best districts of Europe.

The methods of making wine are fully treated elsewhere. We trust that a supply of harmless, cheap, light wine to our people, is not far distant, for it seems certain that in such a supply lies the solution of the problem of our national

Drunkenness—that the way “out of the woods” is through the Vineyard.

Currant Wine.—Take the best and ripest red currants, any quantity. Free them entirely from stems and leaves. Crush them, and strain off the juice through a thick linen cloth. Currant juice contains a large amount of acid, and it is necessary to dilute largely with water. To every quart of pure juice add three quarts of pure water. To every gallon of this mixture add three and a half pounds of the best crushed white sugar. Let it be fermented three weeks in ugs, jars, or clean casks, etc., and return it. Partially close the bung or cork, but not so as to hinder fermentation. Bung tight after fermentation. Let the wine stand two months longer, and then bottle it putting a raisin or a small lump of white sugar in each bottle, and hermetically seal, driving the corks very firmly before sealing. Put the bottles into a dry cool cellar. This wine will keep any length of time and improve by age.

All the vessels, casks, etc., should be perfectly sweet, and the whole operation should be with an eye to cleanliness. In such event, every drop of brandy, or other spirituous liquors added, will detract from the flavor of the wine, and will not in the least degree increase its keeping qualities. This is a pleasant and cheap wine, and makes an agreeable beverage for the sick and convalescent.

The following recipe makes a delicious drink and may be indulged in with impunity by apirists: Dissolve eight pounds of honey in fifteen gallons of boiling water, to which, when clarified, add the juice of ten pounds of red or white currants; then ferment for twenty-four hours. To every two gallons add two pounds of sugar, and clarify with white of eggs.

A quart of cracked walnuts to a barrel of currant wine will improve the flavor greatly.

The white Dutch currant makes, of course, a paler wine than the red, and of very superior flavor. The black currant requires one-third less water, and produces a wine slightly resembling port; it also makes a syrup excellent for sore throat.

Blackberry Wine.—The following recipe is highly commended: “To make a wine equal in value to port, take ripe blackberries or dew-berries, and press them; let the juice stand thirty-six hours to ferment; skim off whatever rises to the top; then, to every gallon of the juice add one quart of water and three pounds of sugar (brown sugar will do); let this stand in open vessels for twenty-four hours; skim and

strain it; then barrel it, leaving a small vent for fermentation, for six weeks. In March it should be carefully racked off and bottled. Blackberry cordial is made by adding one pound of white sugar to three pounds of ripe blackberries, allowing them to stand twelve hours; then pressing out the juice, straining it, and putting a tea-spoonful of finely powdered allspice in every quart of the cordial, it is at once fit for use. This wine and cordial are very valuable medicines in the treatment of weakness of stomach and bowels, and are especially valuable in the Summer complaints of children."

Raspberry Wine.—Bruise the finest ripe raspberries with the back of a spoon; strain them through a flannel bag into a stone jar, allow one pound of fine powdered loaf sugar to one quart of juice; stir these well together, and cover the jar closely; let it stand three days, stirring the mixture up every day; then pour off the clear liquid, and put a quart of sherry to each quart of juice or liquid. Bottle it off, and it will be fit for use in a fortnight. By adding two quarts of cognac brandy instead of one of sherry, the mixture will be raspberry brandy.

Elderberry Wine.—This is the English recipe: "Mix twelve gallons of ripe elderberry juice and forty pounds of sugar with thirty-five gallons of water that has had six ounces of ginger boiling in it; add nine ounces of pimento, bruised and drained off, and when rather less than milk-warm, almost cold, add one pint of good yeast, and let it ferment fourteen days in the barrel. Then bung it close, and bottle it in six months."

Strawberry Wine.—First, get a stout oaken barrel with capacity of forty gallons, if you would make so much. Then, gather, as soon as may be, five bushels of sound, ripe strawberries, and put them into a tub of sufficient capacity, and mash, adding water to facilitate the process. Pass the liquor and pulp through a strainer. Two thicknesses of common mosquito-bar cloth will answer the purpose very well. After pressing the pulp once, wash it through water again and squeeze. These two processes take all that it is desirable to get from the berries, and save the taste of hulls and stems which a longer manipulation would impart to the liquor. Be careful not to add so much water as to increase the liquor to more than thirty-three gallons. Then to the thirty-three gallons add one hundred and twenty pounds best white sugar, stir and dissolve, and having put the barrel in a cool and convenient

place, pour in the liquor. There will be about two or three gallons left over. Reserve the two gallons to keep the barrel full to the bung, as the spume works off, as it will begin to do in about twenty-four hours. At a temperature of seventy-five to eighty degrees the liquor will have worked itself pretty clear in six or eight days. When the fermentation is completed, stop tightly. Let it stand three months, draw off, and bottle. This recipe has been sold for thousands of dollars in the aggregate.

Rhubarb Wine.—To every pound of bruised green stalks, put a quart of spring water; let it stand three days, stirring it twice a day; then press it and strain it through a sieve, and to every gallon of the liquor put two and a half or three pounds of good loaf sugar; barrel it, and to every five gallons add a bottle of white brandy; hang a little isinglass in the cask, suspended by a string, and stop it closely; in six months, if the sweetness be sufficiently off, bottle it for use, otherwise let it stand in the cask somewhat longer. Be as particular as possible, for the wine will not be worth much when you get it made.

Egg Nog.—Take the yolks of eight eggs, beat well with powdered sugar; then add wine to the taste; then beat all well together, and add boiled milk sufficient to disguise the liquor; add a little nutmeg; beat the whites of the eggs to a stiff froth, and put on top.

Best Ginger Beer.—Two gallons of ginger beer may be made as follows: Put two gallons of cold water into a pot, upon the fire; add to it two ounces of good ginger, and two pounds of white or brown sugar. Let all this come to a boil, and continue boiling for half an hour. Then skim the liquor, and pour it into a jar or tub, along with one sliced lemon and half an ounce of cream of tartar. When nearly cold, put in a tea-cupful of yeast to cause the liquor to work. The beer is now made; and after it has worked for two days, strain and bottle for use. Tie the corks down firmly.

The following will give a quicker result: To a pail of water add two ounces of ginger, one pint of molasses, and a gill of good yeast. In two hours it is fit for use.

Lemon Beer.—To a gallon of water add a sliced lemon, a spoonful of ginger, a half pint of yeast, and sugar enough to make it quite sweet.

Corn Beer.—Boil a gallon of shelled corn in ten gallons of water until the grains burst. To this liquor, when strained off in a cask, put half an ounce of bruised ginger root, half an

cunce of cream of tartar, and half a gallon of molasses, and a tea-cup of yeast. When the beer ferments it is ready for use, and will sour in a few days.

Molasses, or Bran Beer.—Put five quarts hops and five of wheat bran into fifteen gallons of water; boil it three or four hours, strain it and pour it into a cask with one head taken out; put in five quarts of molasses, stir it till well-mixed, throw a cloth over the barrel; when moderately warm, add a quart of good yeast which must be stirred in; then stop it close with a cloth and board; when it has fermented and become quite clear, bottle it; the corks should be soaked in boiling water an hour or two, and the bottles perfectly clean and well-drained.

Root Beer.—Take a pint of bran, a handful of hops, some twigs of spruce, hemlock, or cedar, a little sassafras root if you have it; roots of various kinds, plantains, burdocks, docks, dandelions, etc.; boil and strain through a coarse linen cloth. Turn it into an earthen jar, and when sufficiently cool (*i. e.*, not hot enough to scald), add one or two cups of yeast. Stir well, replace the cover of the jar, and when fermented (this occurs in the course of ten or twelve hours) bottle and leave in a cool place.

Spruce Beer.—Boil a handful of hops, and twice as much of the chippings of sassafras root, in ten gallons of water, strain it and pour in, while hot, one gallon of molasses, two spoonfuls of the essence of spruce, two spoonfuls of powdered ginger, and one of pounded allspice; put it in a cask; when sufficiently cold, add half a pint of good yeast; stir it well, stop it close, and when fermented and clear, bottle and cork it tight.

Spruce and root beers admit of a large display of genius in their manufacture, which is exercised with marvelous results in some portions of the rural districts. JOHN H. ANTHONY, of Connecticut, produces an article of root beer that attracts from all the country round people whose appetites are still unperverted. He seems to be specially inspired in the manufacture of beer. Root beer, well made, gives health and a mild satisfaction, while alcoholic drinks are full of headaches and disappointments.

Raspberry Shrub is one of the pleasantest and nicest beverages that can be made in the family. Raspberries are placed in a jar and covered with strong vinegar, and set in a cool place for twenty-four hours. The next day as many

more berries are added as the vinegar will cover, and so for a third day. After the last berries have been in for a day, set the jar in a kettle of water, and bring it to a scald, and then strain out the juice through a flannel. Add one pound of white sugar to every pint and a half of juice, and heat in a tin or porcelain vessel to the boiling point, skim and bottle. Do not boil any longer than necessary to remove the scum. Thus prepared, it will keep for years. Any other of the small fruits may be substituted for raspberries.

Apple Wine.—Take pure cider, made from sound, ripe apples, as it runs from the press, put sixty pounds of common brown sugar into fifteen gallons of the cider and let it dissolve; then put the mixture into a clean barrel, fill it up within two gallons of being full, with clean cider; put the cask into a cool place, leaving the bung out for forty-eight hours; then put in the bung with a small vent, until fermentation wholly ceases, and bung up tight, and in one year it will be fit for use. This wine requires no racking; the longer it stands upon the lees the better. This wine is almost equal to grape wine when rightly managed.

Cherry Cider.—A Shaker recipe: "Thirty gallons of apple cider, eight quarts of dried black cherries, two quarts of dried blueberries, one quart of elderberries, seventy-five pounds of brown sugar. If you desire to make smaller quantities, proportion the quantities of the ingredients accordingly."

Mead.—Boil in a little water two ounces of allspice, and an ounce each of cloves, cinnamon, and orange peel, to be made clear by adding three eggs, or some isinglass. Put the whole into about nine gallons of cold water; then boil and strain it, adding one gallon of honey, and a pound of loaf or crushed sugar; skim it, when it is well boiled, add two ounces of ginger. Now stir it briskly for ten or fifteen minutes and strain again; then when the whole is about blood heat add one pint of good yeast—take it off, and let it work about eight hours; after which draw it off, put it in clean, tight kegs, or bottle it, with a raisin in each bottle.

To Make Good Cider.—The apples should be ripe and sound. Don't press the cheese until the cider runs clear. Let no water be used on the straw. After filling the barrels remove immediately to a cool cellar—let them stand with the bung open until the sediment begins to go down; then close them, and pretty soon after, give it the first racking. About three rackings will remove all the sediment. Bottle

before the weather becomes warm enough for the trees to put out; fill the bottles one-half inch from the corks; let them stand twenty-four hours after filling; then take a bowl of boiling water, dip the ends of cork to go in the bottle in the water; hold the bottle in the left hand by the neck, and drive the cork in with a piece of fence lath. The bottles are then buried in the sand in the cellar. By this process our best apples will make cider that may be drank by epicures for champagne, and will not change for years, only seeming to get more body. In packing away keep the corks up.

To Make the Very Best Cider.—Few are aware how rich a drink cider is when made pure, free from water and the taste of straw, and all the impurities that, under the old-fashioned system of cider-making, are incorporated into its composition. When pure and well made, it is doubtless far healthier than wine, and for liver complaint is a sovereign remedy. On this account alone, the portable cider-mills that make cider without straw are a benefit to the community, and when the farmer will take the same pains with his cider that the vine grower does with his wine, he will find an unlimited demand for it at highly remunerative prices; and, if the severe excise tax on whisky will turn the attention of the people to cider, it will confer an inestimable benefit.

Pick all the apples, rejecting those not sound, and wash them clean, and afterward let them lie and get dry. Grind and press them, using no water or straw, or any substance that will give the cider an unpleasant taste, as on the purity and cleanliness of the apples depends the quality of the cider. Strain the juice through a woolen or other close bag, put into clean barrels, and set in a moderately cool place, keeping the barrel full all the time, so that the impurities may work off at the bung. After it has done working, rack it carefully off, let it stand a few days, and bung it up. As the air tends to sour the cider, it is a good plan to provide a bent tube, one end fastened in the bung, and the other to drop down in a bucket of water. This will let all the gas pass off, and not let the air get to the cider. The quicker the pomace is pressed after being ground, the lighter will the color be, and darker if not pressed for twenty-four hours after being ground. The cider from the second and third pressing will be the richest—the reverse is the case in making wine; as a severe pressure on grapes makes sour wine.

Apple Champagne.—Let the pure juice, drawn

as above recommended, run directly from the press into a filter consisting of a suitable box, about a foot deep by six inches square, filled with a mixture of pulverized charcoal and clean sand, or fine gravel, about half and half. A thin layer of straw is put into the box before it is filled with the filtering material, and the bottom of the box is perforated with fine holes. The juice runs through this filter into bottles, which should be immediately corked to exclude the atmosphere, which gives it the appearance of the real champagne; and our informant, who has used the process, assures us that the wine, after remaining in the cellar awhile, presents the action and flavor of the imported article, with the advantage of being a much more healthy beverage, while its cost does not exceed two cents a quart bottle, where apples are plenty. In lieu of filtering, very good cider-champagne can be made by transferring it from one cask to another three or four times, while it is working, and putting a little piece of rock candy into each bottle when bottling.

To Keep Cider Sweet.—If it is brought to a boiling heat, and canned air-tight, while hot, precisely as fruit is canned, cider will keep half a dozen years without any change of taste. Grated horse-radish roots—half a peck to a barrel—will also arrest fermentation at any desired stage; but it imparts a flavor which is unpleasant to many. A quart of sifted ashes, a pint of pulverized charcoal, two ounces of sassafras bark, and a handful of salt will preserve a barrel of cider. Sulphate of lime arrests fermentation, but it renders the beverage insipid. Probably the best article is cracked mustard seed—half a pound to the barrel. They should be contained in a muslin bag, dropped in at the bung-hole. A few raisins may be added to it to give it "life."

Tea and coffee serve admirably as harvest drinks. Made strong, and drank clear and hot, they are among the best drinks that can be taken into the field; being, doubtful as it may seem to some, decidedly cooling in the warmest weather, as many a farmer knows.

Mulled Wine.—Mix a pint of wine, and a pint of water, and place it in a kettle over the fire. Then beat eight eggs and add to the compound when boiling, stirring rapidly for a few seconds, when it is done.

Whip Syllabub.—One pint of thin sweet cream, one wine-glass of wine, two spoonsful of lemon extract, the white of one egg. Sweeten with pulverized sugar, and beat to a foam.

An effective Ice Pitcher.—The following is

a simple method of keeping ice water for a long time in a common pitcher or jug: Place between two sheets of paper (newspaper will answer, thick brown is better) a layer of cotton batting about half an inch in thickness, fasten the ends of paper and batting together, forming a circle, then sew or paste a crown over one end, making a box the shape of a stove-pipe hat, minus the rim. Place this over an ordinary pitcher filled with ice water, making it deep enough to rest on the table, so as to exclude the air, and the reader will be astonished at the length of time his ice will keep and the water remain cold after the ice is melted.

To Clean Old Barrels.—The inquiry is often made by farmers, brewers, beef and pork packers, etc., regarding the best method of deodorizing and cleansing old cider and beer barrels, musty cans, bottles, etc. Chemistry furnishes an agent in the permanganate of potassa which fully meets this want. A pint of the permanganate turned into the most musty, filthy cider or beer cask, and rinsed about a few moments, will entirely decompose all fungoid growths and fermenting matter, and render the cask as sweet as those that are new. The deodorizing, disinfecting power of the permanganate, holding, as it does, five equivalents of oxygen, is wonderful; it will even deodorize carbolic acid. The only way to remove immediately the odor of carbolic acid from the hands is to immerse them in the liquid permanganate.

Candy.—Taffy may be made by first melting, in a shallow vessel, a quarter of a pound of butter, and adding to it one pound of brown sugar. Stir them together for fifteen minutes, or until a little of the mixture dropped into a basin of water will break clean between the teeth without sticking to them. Any flavoring that is desired, as lemon, pine-apple, or vanilla, should be added just before the cooking is completed. The taffy, when done, should be poured into a shallow dish, which is buttered on the bottom and edges. By drawing a knife across it when it is partially cool, it can easily be broken into squares. Molasses may be used instead of sugar, in making taffy, but it is not so brittle.

Molasses Candy.—Two quarts of West India molasses, one pound of brown sugar, the juice of two large lemons, or a tea-spoonful of strong essence of lemon. Mix together the molasses and sugar, taking care to use West India molasses, which is much the best. Boil to the consistency required.

Sugar Candy.—Six cups of sugar, one cup of vinegar, half a cup of water. Boil slowly about half an hour *without stirring*. Try a little in cold water, and add any essence you choose when done. *Stirring turns it back to sugar.* Pull it until white, and cut in sticks.

Catsups.—These are mostly made of walnut, tomato, or mushroom juice, procured by bruising; the mass being slightly salted, and after some hours severely pressed. The juice is then boiled to the consistency of cream, skimmed clear, and spiced like pickles.

Cucumbers grated up free of seeds, and tomatoes chopped fine and then pressed dry, make delicious catsups. The dry pulp is seasoned with salt and pepper, and made as liquid with vinegar as you like.

Peaches, mashed to a pulp, and seasoned with sugar, nutmeg, and vinegar, is a nice and rare condiment.

Currants may also be made into a delicious catsup without great difficulty.

Tomato Catsup.—Take half a bushel of tomatoes, crush them thoroughly, and add half a tea-cupful of salt. Let them stand over night. Next morning boil in a porcelain kettle until they are soft, and strain through a sieve to remove seeds and skin. Put pulp and juice back in the kettle, and while boiling season with a table-spoonful of black pepper, a tea-spoonful of cayenne pepper, a table-spoonful of whole allspice and cloves mixed, a few blades of mace, and a little more salt if required (some add a pint of vinegar). Boil down one-third. Strain through a sieve, bottle, and cork tight, and keep in a cool place.

Some preserve their catsups in a less solid form by boiling a shorter time. Others make a fine liquid catsup by straining the tomatoes through a flannel bag instead of a cullender or sieve, and boiling down and flavoring as above.

Oyster Catsup.—One pint of oysters, one pint sherry wine or strong old ale, one ounce salt, one-fourth ounce mace, one dram ground black pepper; boil for ten or fifteen minutes, remove from the fire and strain; when cool, bottle for use, adding a spoonful of brandy to each bottle.

Walnut Catsup.—Bruise or chop ten dozen young (green) butternuts, or black walnuts, gathered when they will slice, add a quart of vinegar, and three-fourths of a pound of fine salt. Let them stand two weeks, stirring every day. Strain off the liquor and add to it half an ounce of black pepper, whole; thirty cloves, half an ounce of bruised nutmeg, half an ounce

of ginger, and four sticks of mace. Boil an hour, strain and bottle tight.

Syrups.—For simple syrup, which is the basis of all the fruit and vegetable syrups, take eight pounds sugar (crushed is best) to one gallon water; place over the fire, and allow it to come to a boil; then strain while hot, and cool for use.

Lemon Syrup is made by souring the simple syrup with a solution of citric or tartaric acid, and flavoring with lemon.

Raspberry Syrup.—Take equal parts simple syrup and raspberry juice.

Strawberry Syrup.—Take simple syrup, flavor with extract strawberry, and color with the red coloring alkanet.

Pine-Apple Syrup.—Simple syrup, flavored with extract of pine-apple, and colored very slightly with tincture tumeric.

Sarsaparilla Syrup.—Take three parts best sugar-house syrup (or molasses) and one part simple syrup. Mix and flavor with essence of sassafras and winter-green.

Jelly, Jam, and Marmalade.

For jellies, fresh picked and well-ripened fruit only should be used—the poorer specimens being kept for jams, wines, or syrups. Scald or stone the fruit with as little water as possible; strain, carefully, the juice through a soft linen bag; add equal weight of the best sugar to juice, and boil ten or fifteen minutes, or until it “jellies;” add any flavoring extracts desirable, and then strain through a coarse linen or flannel cloth, and put into wide-mouthed vessels to cool. When cool cover from the air with stout white paper pasted over the edges.

Apple Jelly.—Take apples of good quality and tart flavor; quarter but do not pare or core except to cut away decayed spots; put in a brass or porcelain kettle, with water enough to stew without burning. When boiled to a pulp pour into a woolen jelly bag. Let them strain all night, but do not squeeze. To every quart of juice add a quart of white sugar and a sliced lemon, and boil and skim till it is thick enough (you can tell by cooling a little), then strain again, and it is done. Put it into molds, and let it become cold before covering. Instead of adding lemon, either in slices or extract, some prefer to flavor with cinnamon or vanilla.

Apple in Jelly.—Peel and quarter some good apples and take out the core. Put them in just water enough to cover them, add some slices of lemon and clarified sugar, and cook until they

are soft. Take out the pieces of apple with great care not to break the pieces, and arrange them in jars. Then boil the syrup until it will jelly, and pour it over the pieces of apple.

Apple Marmalade.—Take any kind of tart apples, pare and core them, cut them in small pieces, and to every pound of apples put three-quarters of a pound of sugar. Put them in a preserving pan, and boil them over a slow fire until they are reduced to a fine pulp. Then put in jelly jars and keep in a cool place.

Apple Jam.—Core and pare any quantity of good tart apples, weigh an equal quantity of good brown sugar, then chop up the apples; grate some fresh lemon peel, and shred some white ginger; make a good syrup of the sugar and skim it well; then throw in the apples, lemon peel, and ginger; let it all boil until the fruit looks clear and yellow; this is a delicious jam.

Apple-Butter.—This is an excellent Winter preserve, very cheap, and a good stand-by. For half a barrel, it requires a half-barrel brass or copper kettle to begin with, and fuel enough to keep fire all day or all night, to perpetuate the apple-butter frolics still enjoyed in Pennsylvania. This quantity requires at least half a barrel of sweet cider, and a bushel and a half of apples—sweet are the best. The cider is first boiled down a third; then begin slowly to put in the apples—which have been peeled and cored—adding a pailful, and when these are cooked and partially dissolved, adding more, until at last all are in. The whole must be stirred incessantly to prevent burning, and the boiling must be kept up until the apple and cider are so incorporated that they remain a consistent paste when spooned out into a saucer. When nearly done, flavoring is added to suit, and some sugar, if the apples were tart. It is then put in jars or earthen crocks to cool and keep till wanted.

Quince, peach, or pumpkin-butter can be made in the same way.

A Delicious Dish of Apples.—Take two pounds of apples, pare and core them, slice them into a pan; add one pound of loaf sugar, the juice of three lemons, and the grated rind of one. Let these boil about two hours; turn into a mold, and serve it with thick mustard or cream.

Blackberry Jam.—Gather the fruit in dry weather; allow half a pound of good brown sugar to every pound of fruit; boil the whole together gently for an hour, or till the blackberries are soft, stirring and mashing them well. Preserve it like any other jam, and it

will be found very useful in families, particularly for children—regulating their bowels, and enabling you to dispense with cathartics. It may be spread on bread, or on puddings, instead of butter; and even when blackberries are bought, it is cheaper than butter.

Calf's, or Pig's Foot Jelly.—Boil four feet, nicely cleaned, in a gallon of water, till reduced to one quart; strain it, and when cool take off the top. In taking out the jelly avoid the settlings. Add a half pound of sugar, the juice of two lemons, a little brandy, and, if you please, the whites of four eggs to make it clear; boil all together a few minutes, or until it will stiffen on ice, then strain it through a flannel until perfectly clear, and mold.

Cranberry Jelly.—Two ounces isinglass, one pound double refined sugar, three pints well strained cranberry juice. Make a strong jelly of the isinglass, then add the sugar and cranberry juice, boil up and strain into shape.

Currant Jelly.—Place the currants in a stone or glass jar, and suspend this jar in a vessel of boiling water until the currants are in a condition to yield their juice readily; then place them while hot in a bag, and strain out the juice, pressing very gently. Add refined crushed sugar, pound for pound; stir it until it is all dissolved; set it over a gentle fire; let it become hot, and boil for fifteen minutes; then try it by taking a spoonful upon a cold plate, and if it will hold fast with the plate upside down, it is done, and should be removed from the fire. Should any scum arise, it may be skimmed off. Put the jelly while hot into jars and cover it tightly.

Currant Jelly without Cooking.—Take the juice of red currants, and white sugar, in equal weights. Stir them gently and smoothly for three hours; put it into glasses, set in the sun, and in three days they will concrete into a firm jelly.

Currant Jam.—Strip the currants free from stems; weigh three-quarters of a pound of sugar for each pound of fruit; strain the juice from half of them; then crush the remainder and the sugar together, and put them with the juice in a kettle, and boil until it is a smooth, jellied mass. Have a moderate fire, that it may not burn the preserve.

Cherry Jam requires a similar process; some of the kernels of the stones being added to impart a pleasant flavor.

Gooseberry Jam is the result of the same treatment of either green or ripe gooseberries; but the berries must be broken with a wooden

ladle while they are boiling. Require of sugar pound for pound. A little currant juice improves it.

Other Jellies, such as grape, raspberry, and strawberry, are made in the same manner as that already described for apples and currants, while the remaining pulp is economically put into marmalade. Almost all fruit will make jam, some of the best being made from pears, peaches, grapes, quinces, raspberries, rhubarb, and tomatoes.

Lemon Jelly.—Take five lemons, rub the oil out of two into a large piece of loaf sugar, squeeze the five into a pint and a half of cold water, taking the other half to dissolve five sheets Cooper's isinglass. If there is any difficulty in dissolving the isinglass, take from the lemonade and add to it; when dissolved, add the lemonade and sugar. Strain it into forms.

Orange Jelly.—Procure five oranges and one lemon, take the rind off two of the oranges and half of the lemon, and remove the pith, put them in a basin, and squeeze the juice of the fruit into it; then put a quarter of a pound of sugar into a stew-pan with half a pint of water, and set it to boil until it becomes a syrup, when take it off and add the juice and rind of the fruits; cover the stew-pan, and place it again on the fire; as soon as boiling commences, skim well, and add a gill of water by degrees, which will assist its clarification; let it boil another minute, when add an ounce and a half of isinglass, dissolved, pass it through a jelly-bag, or fine sieve; then fill a mold and place it on ice; turn out. This jelly does not require to look very clear.

Rhubarb Marmalade.—Blanch the rhubarb by covering over the growing plant with an inverted box, barrel, or even by shutting out the light by a frame of sticks and some straw or litter. This prevents the full access of light, the acid secretions and woody fibers of the plant are not fully formed, so that the stalks are tender and require much less sugar than if grown in the open air. They also grow more rapidly and come on earlier. Pare and cut into very small pieces five pounds of rhubarb, add one and a half pounds of loaf sugar, and the rind of one lemon cut very thin and into very small pieces. Put the whole into a dish and let it stand till next day. Then strain off the juice and boil three-quarters of an hour, after which add the rhubarb and boil together ten minutes or a quarter of an hour. A little candied lemon or orange peel cut very thin improves the marmalade.

Preserving and Canning.—The natural complement of fruit-producing is fruit-preserving. The latter secures the full benefit of the former, and in the two we witness the works of God and of man beautifully blended. The art of preserving fresh fruits in nearly their natural state, by hermetical sealing in air-tight cans or bottles, is at once so simple and so satisfactory, that its superiority over the old method of making sweetmeats is universally admitted. It is not only superior to boiling in a kettle "pound for pound," but to the old practice of drying fruit in the sun, and by the heat of stoves and ovens. The present process is more expeditious, and the results far more gratifying. By the old method some of the finest fruits could not be preserved at all; and it may be added in most cases where fruit was preserved by drying, the results were not entirely satisfactory; the delicate flavor of fresh fruits was in no instance perfectly retained; while by the new method, nearly all kinds of fruit may be preserved with one-fourth the amount of sugar, and with few exceptions the original flavor may be nearly retained; and in some instances appears to be even improved.

This process is so simple, and seem to be so desirable, that besides the numerous large companies exclusively engaged in it, hundreds of thousands of private families put up their annual supply of preserved fruits as regularly as they lay by a supply of vegetables for Winter use.

Lime Preserving.—At the Russian court fruit is preserved by being packed in creosotized lime. The lime is slaked in water in which creosote has been dissolved, and is allowed to fall to powder. The bottom of a plain deal box is covered with it one inch thick, and over it is a sheet of paper. Upon this the fruit, well selected and cleansed, is arranged; over this another sheet of paper, and on top of this another such stratum of prepared lime; in the corners a little finely powdered charcoal is put. The whole box is then filled in the same manner, and the well-fitting lid nailed down. Fruit kept in this manner will remain intact at least one year.

Cans, Jars, etc.—The best and handiest vessels for preserving fruit are the self-sealing glass jars. But these are patented and more expensive than many persons can afford. Any sort of bottle, jar, or jug which can be sealed tight will answer the purpose, only if jugs or jars other than glass are used they should be stone ware. The red earthen ware is so

porous that it will sometimes admit air, and then all is lost. Small fruits and tomatoes may be put up in vessels with small necks. It is a little more work to get the fruit into them, but less trouble to cork and seal. Almost any family, however poor, can pick up, or buy at a trifling cost, old bottles enough to preserve a good supply of fruit which may be put up while it is cheap, to be used when it is dear.

The fruit should be ripe, but not over-mellow, free from speck or bruise, and always as freshly picked as it can be procured. Green corn may also be put up in this way and kept as tender and sweet as when it first came from the cob.

Process of Canning.—The process of canning is very simple, but varies, somewhat, in different States and families. The following is the method adopted at the Oneida Community, in New York, by which that neat and thriving, if "peculiar," people put up from ten to twenty thousand quarts in a season:

1. Can the fruit the same day it is gathered. More than half the secret of having fine preserved fruit lies in this simple direction.

2. The fruit is suitably prepared by hulling, assorting, or paring and cutting, as the case demands; and, in most instances, is immediately placed in clean glass bottles, filling them full, and when such fruit as peaches, pears, quinces, etc., are cut in large pieces, it is best to take some pains to crowd the fruit into the bottle—otherwise the heating process will not leave the bottle properly filled with fruit. If any time elapses between quartering large fruit and packing it in the cans, it should stand in cold water.

3. Next prepare a syrup of melted refined or white sugar, and pour into the bottles by the following rule: Allow six ounces of sugar to one quart of fruit; or melt ten pounds of sugar in one gallon of water, and give one-half pint of the syrup thus produced to one quart bottle of fruit. This rule is adapted to the strawberry, cherry, peach, and other similar fruits. More acid fruits, like the currant, require a greater proportion of sugar. Sugar for a few years has been so high that the temptation has been great, for those who put up fruit for sale, to make the proportion of sugar much less than the above rule requires, and some parties have acknowledged that they had reduced the quantity of sugar to three ounces for one quart of fruit. Fruit put up air tight will, of course, keep just as well without sugar as with it, but it is thought much better to heat the fruit in syrup, rather than to heat it in water and apply

sugar as it is used for the table. Moreover, fruit kept in a proper quantity of sugar, is less apt to be "leathery."

4. The filled bottles are then placed in a steaming box—best when made throughout of wood—the bottles rest on a false bottom of narrow slats, covering the steam-pipe—cold water is then let into the box until the bottles are two-thirds covered; the fruit is then gradually heated to the boiling point by letting steam into the water, through a pipe leading from the engine-room in another portion of the building. It requires from fifty-five to sixty minutes to properly heat or cook most kinds of fruit. They are commonly allowed to boil five minutes, but in some instances are taken out of the steam-box before they reach the boiling point. In the absence of a steam-box, of course, the cans may be heated in any kettle of boiling water.

5. Corks are made sufficiently flexible by steaming them twenty minutes with the fruit. They should be large enough to fill the neck of the bottle tightly, and require some force to crowd them in. Formerly one cork, as procured of dealers, was made to stop two bottles, but it is now considered better to use a whole cork for each bottle.

6. Until last year the Community used for sealing-wax a compound of the following proportions: One pound of resin, one and a half ounces tallow, three ounces beeswax; but common boat-pitch is now used, and is found to answer quite as well, and is much cheaper. It is prepared by first being boiled a few minutes, and then heated every time a batch of fruit is to be sealed.

7. The fruit being sufficiently heated, the corks steamed, and the boat-pitch ready, the bottles are taken successively to a table and quickly corked. The corks may be forced in by a blow from a mallet, or better by a small lever arrangement, or best by such a machine as that used here, and in other fruit establishments, which, worked by hand and foot, performs this operation easily and rapidly. The portion of cork remaining above the bottle is pared off with a sharp knife, and left in convex form.

8. Some fruit preservers, at this stage, pack their fruit away, laying the bottles down on the side and trusting to the cork, thus kept moist, to exclude the air, and sealing the bottles when they fill orders for the market, and when they are less hurried; but the Community have always sealed their fruit immediately after it is

corked, which is done by dipping the mouth of the bottle in the melted sealing-wax or pitch, so as to cover the bulb. Then transfer it to a basin of cold water, dipping to the same depth, to cool the wax. If the dipping is carried below the bulb or rim at the mouth of the bottle, there is danger of cracking the glass. Now, examine the sealed part to see if the wax has formed blisters. If there are blisters rub them away with the finger, using a little tallow or oil to prevent sticking.

9. The operation is now completed, and the fruit ready to be packed away on shelves or in chests, in a cool, dry cellar. If placed on shelves, a cloth should be hung before them to exclude the light. In a few days after packing away, inspect the bottles to see if any show signs of fermentation, which may be detected by a foamy appearance of the fruit. If this is observed in any bottle, it denotes either a crack in the glass or that the sealing was imperfect. The bottle should be opened and examined, the contents scalded, and the process of sealing repeated as before. In some cases during the season a little vegetable mold may be seen to gather on the surface of the fruit in the bottles, but this is not to be regarded, as it can be readily separated on opening the bottles, leaving the mass of fruit uninjured.

To save time, when there is a large quantity of peaches, quinces, or other fruits to put up, it is usual to pare and stone them; and let them come to a brisk boil in a preserving kettle, with as little stirring as will prevent them from scorching; the cans being already warmed by standing in hot water, are then filled from the boiling-kettle (which must be kept on the fire while the cans are being filled) and sealed immediately. This takes less time than filling with cold fruit and heating the can up in boiling water; and the fruit is as good, though more broken than when put up carefully.

Canning Tomatoes.—There is a variety of methods practised in preserving tomatoes. An excellent process is to scald and peel them, and then place them in a steam-boiler, where they are boiled from twenty minutes to half an hour. The bottles are filled directly from the boiler—having been previously heated in the steam-box, so as to avoid the danger of bursting, and are then ready for sealing. Or, a cheaper way is to dip from the boiler into tin cans, and get a tinker to seal. Some slice and can with syrup made from sugar—a quarter of a pound of sugar to a pound of fruit.

Tomato Preserves.—Take the round, yellow

variety of tomato, as soon as they are ripe; scald and peel; then to seven pounds of tomatoes add seven pounds of white sugar, and let them stand over night. Take the tomatoes out of the sugar, and boil the syrup, removing the scum. Put in the tomatoes, and boil gently fifteen or twenty minutes; remove the fruit again, and boil until the syrup thickens. On cooling, put the fruit into jars, and pour the syrup over it, and add a few slices of lemon to each jar, and you will have something to please the taste of the most fastidious.

Tomato Figs.—Collect a lot of ripe tomatoes, about one inch in diameter, skin and stew them in the usual manner; when done lay them on dishes, flatten them slightly, and spread over them a light layer of pulverized white or best brown sugar; expose them to a Summer's sun, or place them in a drying-house; when as dry as fresh figs, pack in old fig or small boxes, with sugar between each layer. If properly managed, the difference can hardly be detected from the veritable article.

Sweet-Corn.—The Oneida Community every season puts up a few thousand cans of sweet-corn. It was formerly thought difficult to preserve this article, except by drying. There are now establishments which put up sweet-corn very extensively. One in Camden, New York, employs ninety persons, and puts up mainly corn, beans, and fresh meat. The process there followed is to put the corn in cans immediately after it is cut from the cob, seal it up, and then boil it in the cans five hours; then punch a hole in the top of the cans, to let out the steam, and then seal up again, and pack away.

The following directions are followed at Oneida: Cut the corn raw from the cob, and put it into tin cans, and add cold water to fill up the interstices, and seal up with solder. Punch a small hole in the top and solder that up. Put the cans in a boiler and boil them two and a half hours. Then take them up one at a time, and melt the solder from the small puncture, and let the steam blow off while boiling hot, and again solder up the hole. Return them to the boiler and boil them two and a half hours more.

There are two other methods of keeping corn; by drying it by sun or fire, Indian fashion, and by salting down—but either is inferior to the above process of canning.

The *Prairie Farmer* commends the following: "Plant corn in the ordinary way, about the 15th of July, giving it the usual care.

About the time for early frost the corn will be suitable for table use, when cut up the stalks, and shock it in the field. When needed for the table in Winter, open a shock, take out as much as wanted, and then close it again. This will furnish green corn in perfection."

Apples.—Apples are put up, by some of the best manufactories, in fresh apple juice, and are thought to be much better than when put up in water. At Oneida, during the month of October, the preserving group is engaged in bottling apples. One might at first question the expediency of bottling so common a fruit; but doubt on this point disappears when it is considered that the labor of preserving apples in this way is scarcely more than the labor of preparing them for sauce or pies; or cooking them in any form—that it is even less than the labor of drying them—that the bottled apples are just as good as green apples in their best condition—much better than green apples that have been kept a few months—altogether preferable to dried apples, which are never of first-rate flavor, and are often damaged by parasites; and, further, that by this means Fall apples, and such fruit as would soon decay and become worthless, are made just as available in future months as the best keeping varieties.

Apple Preserves.—Almost everybody can make apple-sauce very good; but this dish, for a variety, is quite a treat. Pare and core the apples, cutting them in halves or quarters, as you like. For every pound of apples take three-quarters of a pound of sugar and make a syrup, by adding water sufficient to keep it from burning, while heating it over a slow fire. When the syrup is boiling hot remove it from the fire, put the apples in and let them stand one night. This will toughen and prevent them from falling to pieces. Then boil them over a slow fire until they are cooked tender. If loaf sugar is used the preserves will be very clear and handsome. If the syrup is made of brown sugar, it should be well skimmed before putting in the fruit, and also while cooking.

Canning Cherries.—Take the common sour cherries, stone them, fill your cans or bottles, set them into warm water, heat until air is expelled, and cork as before directed.

It will be necessary to have some reserved cherries to fill the bottles, as they shrink very much, and there must be no space between the fruit and the cork. Stoning the cherries is quite a tedious process, but the rest of the work can be done very rapidly. There is no fruit keeps better than cherries, and, after being pre-

pared in this way, they are much better, when stewed with half a pound of sugar to one pound of fruit, than the richest preserves boiled in sugar syrup pound for pound.

To Preserve Citron.—Prepare the rind, cut into any form you desire; boil very hard thirty or forty minutes in alum water, tolerably strong; take the pieces from the alum water, and put into clear cold water; allow them to stand over night; in the morning change the water, and put them on to boil; let them cook until they have entirely changed color, and are quite soft; then make your syrup, allowing one and a half pounds of white sugar to one pound of fruit; then add your fruit, which needs but little more cooking. Mace, ginger, or lemon flavors nicely.

To Preserve Citron for Cake.—Take a common-sized citron and cut it in four pieces; to every six pounds of citron take a piece of alum the size of a hickory nut, dissolved in water, enough to cover the citron. Boil until tender in the water, and then preserve your citron the same as for any use, "pound for pound." When boiled sufficiently in the sugar, take the pieces out on a plate, and let the syrup boil down as thick as possible, without burning. Put the citron in a moderate warm oven, and pour the syrup over it. As it dries, some add cloves and cinnamon.

Canning Gooseberries.—Gooseberries, and all other berries, may be canned with excellent results by the process we have given as that in vogue at Oneida. The ripe gooseberry, however, is apt to lose its form. This is remedied by modifying the canning formula as follows: Pour boiling water over ripe berries; have the cans ready and warm; lift the berries out of the water, and put into the cans immediately; pour boiling water in until the can is full, and seal immediately. The fruit will remain perfectly whole.

Currants.—Currants may be canned as directed, or they may be preserved as follows: Take ripe currants, free from stems; put a tea-cup of sugar to each pound; boil the syrup until it is hot and clear; then turn it over the fruit; let it remain one night; then set it over the fire, and boil gently until they are cooked and clear; take them into the jars or pots with a skimmer; boil the syrup until rich and thick; then pour it over the fruit. Currants may be preserved with ten pounds of fruit to seven of sugar. Take the stems from seven pounds of the currants, and crush and press the juice from the remaining three pounds; put them into the hot

syrup, and boil until thick and rich; put it in pots or jars, and the next day secure as directed.

Spiced Currants.—Take four quarts of currants deprived of the stem, one pint of vinegar, two pounds of crushed sugar, one tea-spoonful each of allspice, cloves, and cinnamon, powdered fine. Boil all together until about the consistency of jelly, then remove from the fire and put away in closely covered jars for use.

Cucumber Preserves.—Cucumbers that have gone to seed, may be made an excellent use of in the following manner: Pare them and scrape the seeds out; then slice them into strips, and boil them till they are a little tender; then lay them on a cloth to drain an hour or more; after the water is out, pack them down in a jar, treating each layer with a slight sprinkling of sugar and powdered cinnamon and cloves. Cover them with vinegar, and in twenty-four hours they are fit for use, and good enough for an epicure (if he be not a dyspeptic).

Grapes.—Grapes may be kept for many months, preserving even their bloom, by gathering when fully ripe, and packing in triple layers in oats, previously scalded and dried, letting the oats at top and bottom be at least four inches in depth; keep in a cold dry room.

Grapes may be canned according to the directions we have given for canning fruits. They are said to be better if the seeds are taken out and the skins left.

Pumpkin Butter.—Wash the pumpkin clean, take out the seeds, and scrape the inside out with a strong iron spoon. Boil till soft, and rub through a coarse sieve. When strained, put into a kettle, and boil slowly all day, stirring it often. Put in a large handful of salt. When nearly done, add a pint of molasses, or a pound of brown sugar to each gallon of pumpkin. Before it is quite done, add allspice, cinnamon, ginger, and nutmeg, one or all, as you may fancy. Put it into jars when done—large ones are best. Tie it up tightly, and it will keep until April or May, in a cold place, if you scald it when Spring comes on. It is a good sauce for table use, and is always ready for pies, with the usual addition of eggs and milk. It is much less trouble and far better than "dried pumpkin."

Peaches.—Can peaches as follows: Remove the skin of the peaches by pouring hot water upon them, and afterward wiping them with a coarse cloth; put them into glass or earthen jars, cork them up, and fasten the corks with wire or strong twine; then place the jars in a kettle of hot water until the atmospheric air is

expelled from the jars; after which seal them up tight with wax. Peaches prepared in this way retain their original flavor, and are equally as delicious, when cooked in the ordinary manner, six months or a year after being put up, as if just taken from the tree.

Preserve peaches thus: One pound of sugar to one of fruit; put on the sugar, let it come to a boil, have the fruit cut and pared in large pieces, let them boil till thoroughly done, but not too soft; drain the fruit from the syrup, and place on flat dishes in the sun until they harden; then boil the syrup till thick, and pour all into a jar; add a little mace, and tie up closely. A piece of writing-paper, cut to fit the jar, steeped in brandy and put over the fruit, will keep them.

The following recipe results in a superior article of *dried peaches*—far better than by the common method: Take the freestone peach when not too ripe, peel and halve them, taking out the stone, fill the cavities with sugar, and dry in hot sun or a warm oven.

Pears.—Pears, plums, and quinces require the same treatment as peaches in canning, excepting that some very hard ones need longer heating to exclude the air.

Rhubarb (Pie-Plant).—Prepare the rhubarb as follows: Take one pound of the stalks after they are pared, and cut them into short lengths, and put them into a quarter of a pint of water, previously boiled with six ounces of loaf sugar, and simmer the fruit in it for about ten minutes. It will then form a sort of *compote*, which is preferable to the undressed rhubarb for Spring tarts.

Strawberries will more successfully preserve their color and flavor by canning them than any other way, but they require at least a pound of sugar (white sugar is best) to a gallon of fruit. Some prefer two pounds of sugar to a gallon of fruit, but we believe one pound as a rule will be sufficient to preserve them when canned. To preserve them without canning, it will require at least a pound and a half of sugar to a pound of fruit, to prevent fermentation, and they should be kept in a cool dry atmosphere.

An important item in canning the strawberry is to have them thoroughly heated before putting in cans, and the sooner they are sealed after being sufficiently heated, the better they retain their color and flavor. If heated in the cans, it requires a constant filling up, and when the cans are full, the fruit at the bottom of the cans is often stewed instead of being well heated, which is all it requires. We think it desirable

to make a syrup of the sugar. A pound of sugar to a gallon of fruit, in which it is thoroughly heated before putting in cans, sealing as quickly as possible afterward. Strawberries are excellent dried in sugar. A pound of sugar to a gallon of berries. Always select the smaller for drying and the larger for canning and preserving, as the smaller or even medium-sized strawberries will dry nearly as soon as the raspberry, if sprinkled with the sugar and laid on earthen plates in a moderately warm oven. They stew easily and regain their color and flavor when stewed.

Raspberries are more easily canned than strawberries, and require only half the quantity of sugar, but need the same attention to heating, sealing, etc. They also are excellent dried, and many prefer the dried to the canned raspberry, as they are always convenient, are easily stewed, and their flavor and color are superior to the canned raspberry. They can be dried either in the sun or in a warm oven, but should be dried as quickly as possible, and placed in strong cotton or paper bags (paper is best) and kept in dry paper or wooden boxes, or on shelves in dark closets, or almost anywhere where flies will not disturb them.

Molasses to Preserve Fruit.—The following process will render molasses much better suited for that purpose than a syrup prepared from the best loaf sugar, as it is not so liable to candy, nor if well prepared, to ferment. Take eight pounds molasses, bright, New Orleans, or sugar-house, eight pounds pure water, one pound coarsely-powdered charcoal, boil for twenty minutes, then strain through fine flannel double, put it again in a kettle with the white of an egg, and boil gently, till it forms a syrup of proper consistency, and strain again.

To Clarify Sugar for Preserves.—Break as much as required in large lumps, and put a pound to half a pint of water, in a bowl, and it will dissolve better than when broken small. Set it over the fire, with the well-whipt white of an egg; let it boil up, and when ready to run over pour a little cold water in to give it a check; but when it rises a second time, take it off the fire, and set it by in the pan for a quarter of an hour, during which the foulness will sink to the bottom, and leave a black scum on the top, which take off gently with a skimmer, and pour the syrup into a vessel very quickly from the sediment.

Pickles.—Pickle-making is carried on as

an extensive business by many farmers in different parts of the country; and if rightly managed, it is very profitable. A farmer in Illinois grew sixty acres of cucumbers in a single year, from which he put up sixteen hundred barrels of pickles—more than twenty-six barrels per acre. These cost him, delivered in Chicago, about sixty cents a barrel; and he sold them for \$18 a barrel—the total yield amounting to more than \$28,000—\$480 an acre.

To Make Pickles Green without Poisoning.—Brass and copper vessels should not be used in pickling. Cooks frequently put pickles in them that they may acquire a rich green color, which they do by absorbing poison. Families have often been thrown into disease by eating such dainties, and have died in some instances, without suspecting the cause. Sour-kraut, when permitted to stand some time in a copper vessel, has produced death in a few hours. From these metals comes a green substance; the carbonate or protoxide of copper; and from vessels glazed with lead comes the acetate of lead, equally poisonous.

It is well to know that pickles may be made green by merely steeping the leaves of the grape-vine, or those of spinach or parsley, in the vinegar.

Cucumber Pickles.—A satisfactory price for cucumber pickles depends upon their small size. Large pickles will not sell. To be salable, the cucumbers should never exceed four inches in length; three inches is still better, and from that down to two inches is preferable to a larger size. It may, at first, seem that by pickling when so immature, the crop will be greatly reduced; but it is not so, for the vines will produce a vastly greater number of small than of large cucumbers. There is extra work in picking, but this is thrice offset by the difference in price. Gather small cucumbers, and put them up in good condition, and there is always a market for them at paying rates. Cut the cucumbers from the vines with scissors; a knife will disturb the vines, and pulling off will lacerate the vegetable; leave half an inch of stem. Rinse but do not wipe them. Keep kegs or jars ready to receive your pickles as gathered. Those of no peculiar flavor, such as cucumbers, melons, etc., can be put together. Keep them in strong brine, a coarse cloth spread over them, and a weight, on a board, keeping them under brine all the time.

Another method for making pickles is to put the cucumbers in a barrel, and sprinkle freely with fine salt. The moisture within dissolves

the salt, and thus a strong, fine brine is formed. The fruit itself will shrivel, but the plumpness will be restored as soon as it is put into vinegar.

When you wish to prepare them for table use, soak them in a succession of clear water until free from salt. Then green them with grape leaves, in alum water, simmering them slowly. Scald them in strong vinegar for ten minutes, and tie up closely in jars. After a few days pour off this vinegar, and pour on them strong boiling vinegar, with spices, horse-radish, mustard, pepper, or anything you like, strewn between the pickles in a jar.

The following is the recipe for cold pickles: Let your pickles wither after gathering. Have your vinegar salted agreeably, and strongly spiced; and cucumbers, nasturtiums, peaches, and many other fruits, are nicer for being pickled without scalding. The pickles require time for perfection.

Cucumber and Onion Pickle.—To a dozen fine cucumbers allow three large onions; pare the cucumbers and peel the onions, and cut both into thick slices; sprinkle salt and pepper on them, and let them stand till next day. Drain them well, and put them in a stone jar; pour boiling vinegar on them, close the jar, and set it in a warm place. Next day repeat the boiling vinegar, and cork the jar. Next day repeat the boiling with a bag of mace, nutmeg, and ginger.

Green Pickle.—One peck of tomatoes, eight green peppers to be chopped fine, and soaked twenty-four hours in weak brine; then skim out, and add one head of cabbage chopped fine, and scald in vinegar twenty minutes. Skim it out, and put in a jar, and add three pints of grated horse-radish and spices to suit the taste. Pour over cold vinegar.

Ripe Cucumber Pickle.—Take large and ripe cucumbers before they become soft; cut in rings, pare, divide in smaller pieces, and remove the seeds; cook the pieces very slightly in water salted just enough to flavor well; drain and put in a stone jar. Prepare a vinegar as follows: Two pounds of sugar to two quarts of vinegar; a few slices of onion, some cayenne-pepper, whole allspice, whole cloves, cinnamon according to one's judgment and taste.

To Pickle Onions.—Get white onions that are not too large, cut the stem close to the root with a sharp knife, put them in a pot, pour on boiling salt and water to cover them, stop the pot closely, let them stand a fortnight, changing the salt and water every three days; they

must be stirred daily, or those that float will become soft; at the end of this time take off the skin and outer shell, put them in plain cold vinegar with a little tumeric; if the vinegar be not very pale, they will not be of good color.

To Pot Lobsters.—Half-boil them, pick out the meat, cut it into small bits, season with mace, white pepper, nutmeg and salt; press close into a pot and cover with butter; bake half an hour; put the spawn in. When cold, take the lobster out and put it into the pot with a little of the butter; beat the other butter in a mortar with some of the spawn, then mix that colored butter with as much as will be sufficient to cover the pots, and strain it; cayenne may be added, if approved.

Pickled Eggs.—At the season of the year when eggs are plentiful, boil some four or six dozen in a capacious sauce-pan, until they become quite hard. Then, after carefully removing the shells, lay them in large-mouthed jars, and pour over them scalding vinegar, well seasoned with whole pepper, allspice, a few races of ginger, and a few cloves or garlic. When cold, bung down closely, and in a month they are fit for use. Where eggs are plentiful, the above pickle is by no means expensive, and is a relishing accompaniment to cold meat.

Stuffed Peppers.—Take large bell-peppers and cut off the tops, and take out the seeds; have ready a quantity of finely-cut cabbage, scraped horse-radish, white mustard-seed, and if convenient, nasturtium-seed; stuff each pepper and sew the cover on; put in each pepper two or three whole cloves and allspice; then put them in salt and water, and let them stand twenty-four hours. Place them in stone jars and cover them with scalding vinegar, keeping them closely covered. The peppers will be milder if soaked in the brine before being stuffed.

Pickled Walnuts.—Gather them dry, prick them with a large pin two or three times, put them into salt and water, shift them every three days for a fortnight, put them into a sieve and let them stand a day in the air, and then put them into an earthen jar. Boil as much vinegar as will cover them well; pour it boiling hot over them; let them stand three days; then put them into a sieve and let them stand in the air another day; then take to every quart of fresh vinegar that may be wanted half an ounce of black mustard-seed, half an ounce of horse-radish cut into slices, a quarter of an ounce of long pepper, three cloves of garlic, a dozen cloves, four or five pieces of raw ginger, and a

few eschalots. Boil these ten minutes, and pour it boiling hot over your walnuts. Let it stand a fortnight; then put them into bottles corked close, and cover the corks with resin. They will keep for years.

Pickled Cauliflower.—Have a kettle of boiling water, and put in one at a time, with top down, unless the kettle is large enough for more, and boil it until tender. Have ready a jar of cold vinegar, with cloves and mace; drain the cauliflower well, and put into the vinegar while hot. Cover tightly, and it will be ready for use in a week or ten days.

Piccalilli.—Of cut cucumbers, beans, and cabbage, each four quarts; of cut peppers and onions two quarts each; celery and nasturtiums four quarts each. Pour on boiling vinegar, flavored strongly with mustard, mustard-seed, and ground cloves.

Tomato Chow-Chow.—One-half bushel green tomatoes, one dozen onions, one dozen green peppers, chopped fine; sprinkle over the mess a pint of salt, let it stand over night, then drain off the brine; cover it with good vinegar, let it cook one hour slowly, then drain and pack in a jar; take two pounds of sugar, two tablespoonfuls of cinnamon, one of allspice, one each of cloves and pepper, one-half cup of ground mustard, one pint of horse-radish, and vinegar enough to mix thin; when boiling hot, pour over the mess packed in the jar, and cover tight. Then it is ready for use and will keep for months. Cabbage chow-chow may be made by substituting sliced cabbage for tomatoes.

To Pickle Cabbage.—Take a firm, fresh cabbage, remove the whole of the outer leaves, keeping the ball entire. Cut it into four quarters, and, subsequently, into strips, and place them on a hair-sieve or a clean, dry cloth, and sprinkle with salt. Let them remain for three days to allow the brine to drain off. After they are thoroughly drained, put them into a clean jar. Take as much vinegar as will cover them, and let it simmer over a slow fire, with allspice, whole black pepper, coarse brown ginger, and a little pimento. When the vinegar is sufficiently flavored let it cool, and pour it over the cabbage in the jar, which must be stopped down for use, and kept for three months.

Sour-Krout.—Take solid heads of cabbage—the Drumhead Savoy is best, though the common drumhead will answer well, and is larger—cut up the heads as for cole-slaw, though not so fine. A good way to do this is to put the heads into a clean barrel, and chop them with a com-

mon spade, ground sharp. Put a few broad leaves at the bottom of the barrel in which you are to make the sour-kroust, and sprinkle with fine salt. Now put in a layer of cut cabbage, about six inches thick, and sprinkle with fine salt; with a wooden pounder compact it firmly together until the juice begins to show itself on the surface; then add another layer, and so on until the cask is full. Cover with leaves and a board or barrel-head, upon which place a clean stone of twelve or fifteen pounds weight. About three pints of salt is enough for a barrel. The barrel must be perfectly tight, so the juice will not leak out, else the kroust will spoil.

In the course of a week, the scum that rises to the top should be removed. Remaining from four to six weeks undisturbed, it is fit for use. The vessel should not be used for any other purpose, and each year thoroughly cleaned, so as to be free from any odor. The best place for keeping it is a cool cellar, but not so cold as to freeze.

Pickled Beans.—Procure your young beans from a late crop; boil them in water, slightly salted, till tender; throw them in a colander, with a dish over to drain; when done dripping lay them out on a dry cloth and wipe. Pour boiling vinegar, spiced, over them, and you have an excellent pickle—these are delicate for tea.

Sweet Pickles.—Cherries, peaches, raspberries, tomatoes, plums, and crab apples may be made into very delicious sweet pickles, by adding something like half their weight of sugar to their full weight of spiced vinegar, when the spices are boiling in it, and pouring it over them while boiling. Peaches are soaked in lye and rubbed free of fur; pears are peeled; plums pricked with a fork; cherries and grapes with their stems, are laid in jars, the cherries with their leaves strewed between.

One correspondent gives the following recipe: "For seven pounds of fruit allow three pounds of sugar, one ounce of cinnamon, and one-quarter ounce of cloves, both unground. Put in a stone jar a layer of fruit, then one of sugar and spice, then fruit again, and so on until the jar is full. Fill the jar with good cider vinegar, and set it into cold water. Let it heat slowly at first. When the fruit seems to be cooked, take it out, and when cool it is ready for use. An easier way, and one that is equally good, is to boil the vinegar, sugar, and spice together, and pour boiling hot over the fruit.

The next day pour it off, boil and put it on again. Do the same the third day."

Another: "If peaches, they are better to be mellow and nice for eating; peel, pack in a jar, and turn the pickle on boiling hot, but I never boil the fruit. For pears, pickle the same as for peaches; peel and steam the pears; pack in jar; pour the pickle on hot. I use the same pickle for seed cucumbers; to prepare the cucumbers, peel, cut open, scrape out the seeds and pulp clean, and cut into pieces of a convenient size; make a weak brine in a porcelain kettle; boil till the fruit looks clear; take out as fast as it gets done, into a colander to drain; pack in a jar; pour the pickle on hot. Green tomatoes make an excellent pickle, but require good sharp vinegar; less sugar makes them good. Plums and cherries are also delicious pickled; they require no cooking—only pour the pickle on hot, the same as for peaches."

Sweet pickles must stand several months before they are first-rate, and years only improve their quality.

If you would make them quite plain, and cheap enough for every-day use, take but a quarter of a pound of sugar to a pound of any fruit; this will make a good but not very sweet pickle.

Pickled Plums.—"After weighing, place the plums in a jar or crock, a layer at a time; between each layer scattering a few cloves, stick cinnamon, and allspice. Then to three pounds of fruit allow one pound of sugar, and vinegar enough to moisten nicely; boil and pour over; set the jar in a kettle of warm water, and let the water boil till the plums are soft, or drain them and pour over again till the juice will cover the plums."

Sweet Tomato Pickle.—The following recipe, handed us by a friend, and thoroughly tried, is recommended as making the best sweet pickle we have ever tasted. Take eight pounds of green tomatoes, and chop fine. Then add four pounds of brown sugar, and boil down some three hours. Add a quart of vinegar, a teaspoonful each of mace, cinnamon, and cloves, and boil about fifteen minutes. Let it cool and put into jars or other vessel. Try this once, and you will try it again.

The following is another tomato pickle—not so sweet: Slice one gallon of green tomatoes, and put a handful of salt to each layer of tomatoes. Let them stand twelve hours, then drain off the liquor, and add to them two green peppers, and from two to four onions sliced. Take two quarts strong cider vinegar, a little more

than one-half pint of molasses, and two table-spoonfuls of whole mustard, and a tea-spoonful of allspice, same of cloves, and heat until it begins to boil. Then put in tomatoes, onions, and peppers, and let them boil ten minutes. Pour them into a stone jar, and seal tight, and put them in a cool place for a fortnight, after which they will be ready for use, and will keep a year without scalding.

Sweet Pickled Peaches.—“Pare clingstone peaches, just ripe. To four pounds of fruit allow two pounds sugar, half a pint of cider vinegar, one table-spoonful of cinnamon, and one of cloves, tied in a thin rag. Use a porcelain kettle. Boil the vinegar, sugar, and spice until the sugar is melted; then add the fruit, and boil until tender. Remove the fruit with a skimmer, and boil the liquor to a thick syrup; return the fruit, and simmer until done; pour out and let stand till cool; then seal up tight, removing the spice.”

Spiced Plums.—Take one pint vinegar, and add three pounds sugar, one tea-spoonful each, of cloves, cinnamon, and allspice; boil all together; have ready four quarts of plums; repeat the boiling of the liquor each day for nine days, and each time, while hot, pour on the plums.

Vinegar.—The appetite for acids is quite as general, and also quite as natural and healthful, as that for sweets. There should be at least two vinegar barrels in every household—one in which vinegar is always making, another in which vinegar is kept for use, and the last should be constantly replenished from the first. The barrel for making vinegar, as it is intended to be a perpetuity, if not a fixture, should be stout, sound, iron-hooped, and painted, as it should stand through the warm months out of doors, as vinegar forms much more rapidly in the sunshine. In Winter the process will go on much more slowly in a warm room or cellar.

This barrel should have a close-fitting cover; in this cover, or near the top of the barrel, should be bored a number of auger holes, or the barrel may be laid on its side with the bung out. These are to promote free circulation of air; over them tack a fine wire gauze or cloth to exclude the gnats and insects which swarm around such attractions. The liquid should be agitated by a dasher, or by shaking the barrel frequently. The philosophy of vinegar-making is simply the exposure of a liquid that is predisposed to sour to the influence of light and atmospheric air.

Cider Vinegar.—We give several different recipes: 1. Fill a barrel three-fourths full of cider; set it in the sun; leave the bung out and shake daily, and you will in time have vinegar of such strength as will need weakening for use. A bucketful of strong vinegar, or a couple of gallons of molasses, will hasten the process. When strong enough, rack off—stop closely, and set in a cellar that will not freeze.

2. Have a vessel large enough to hold the pomace when you have been cider-making, and as much water as you have pressed cider from it. It is best to use warm water. Stir up the mass at least every day, the oftener the better. When it is soured, but not rotted, press it out and treat as directed in making cider vinegar. This vinegar will make sooner than the pure cider, and it is called, for distinction, apple vinegar; of course it is inferior in strength, but it is the article nearly always sold as cider vinegar. The pomace of grapes will make vinegar by the same process.

3. “Common dried apples, with a little molasses and brown paper, are all you need to make the best kind of cider vinegar. And, what is still better, the cider which you extract from the apple does not detract from the value of the apples for any other purpose. Soak your apples a few hours—washing and rubbing them occasionally, then take them out of the water and thoroughly strain them through a tight-woven cloth; put the liquor into a jug, and add a pint of molasses to a gallon of liquor, and a piece of common brown paper, and set in the sun, or by the fire, and in a few days your vinegar will be fit for use. Have two jugs and use out of one while the other is working.”

Molasses Vinegar.—In a common barrel, three-fourths full of rain water, mix four gallons of molasses and a bucket of strong vinegar or a gallon of whisky. Expose to the sun, or keep in a warm cellar, and shake frequently. This is a pure and good preparation, and the most common in market, except chemical preparations, which exercise as deleterious influence over health as drugged whisky.

The Vinegar Plant.—The vinegar plant belongs to the genus of fungals (*Penicilium glaucum*), and is easily propagated by following the annexed recipe: Take a half pound of brown sugar and a half pint of molasses; simmer them in three quarts of water till well dissolved, then place the mixture in a wooden or stone pot, cover it over, and place behind the stove in a warm situation. In about six or

seven weeks you will find floating on the top a tough, fleshy substance—this is the vinegar plant; the mixture will have turned to vinegar, but of a poorer quality than will be manufactured with its aid. Now prepare a mixture as before, and when *coolish*, lay over it the vinegar plant. A bit of lathing or shingle should be laid upon the mixture before placing the plant over it, as the vinegar is of a purer quality if the plant does not lie wholly upon it. Set it behind the stove or beside the range, covering it closely, and in two weeks or more, taste it; if sharp vinegar, bottle it, and continue your manufacture. The vinegar is of a dark color, but of far better quality than what is bought generally for cider vinegar, but has never seen apples. It is probable that what is termed the “mother” in vinegar is closely allied to this plant, and might be employed by those who desire to produce a “vinegar plant” without delay. The cost of vinegar made in this manner is extremely small, and as it is a condiment so universally employed in culinary matters, we recommend it to our readers. We do not think that there is anything deleterious in its properties, and it would certainly give many families a large supply of vinegar, who would be unable to procure it in any other manner. A small wooden butter firkin would be an excellent utensil for the preparation, as it could be covered tightly.

Corn Vinegar.—Boil a peck of shelled corn in ten gallons of water until reduced half—strain off the liquid, mix with it a half gallon of molasses and as much good vinegar, and expose to the sun and air as you were directed for cider.

Beet Vinegar.—Wash a bushel of sugar-beets, then grate and press out the juice; put this into an empty barrel, cover the bung-hole with gauze and set in the sun. In a fortnight it will be fit for use.

Tomato Vinegar.—Mash the tomatoes in an open tub, and add a quart of molasses to each bushel. Let the pomace ferment until it begins to have a decided vinegar odor, stirring it frequently during the several days it stands. Then strain the juice from the pomace, and put into casks, and let it stand until the process is completed, which will be greatly facilitated if you can add one gallon of good cider vinegar to every ten gallons of tomato juice.

Strawberry Vinegar.—Pour one quart good vinegar on two quarts very ripe strawberries, and let them stand three days. Then drain the vinegar through a wire strainer, or a jelly

bag, and pour it on to the same quantity of fresh berries. Repeat this the third time, then add a pint of sugar to the strained juice—boil it a few minutes, and when cool, bottle and cork. A table-spoonful in a glass of water makes a delicious cooling drink.

Raspberry Vinegar.—Red raspberries, any quantity, or sufficient to fill a stone jar nearly full; then pour upon them sufficient vinegar to cover them. Cover the jar closely and set it aside for eight or ten days, then strain through flannel or muslin and add to the clear liquor three-quarters of a pound of sugar to each pint; place over the fire and boil gently for a few minutes, then allow it to cool and bottle for use. This makes, when mixed with water, a delightful Summer drink; also, very beneficial for convalescents.

Currant Vinegar.—About a bushel and a half of ripe currants well pressed, and the juice put into a molasses or syrup barrel, with six quarts of syrup, and filled up with water, will make a barrel of excellent vinegar.

Aromatic Vinegar.—Dissolve two ounces pulverized camphor in one pint strongly concentrated vinegar, and half an ounce each of oils garden lavender, cloves, and rosemary. Keep it in small phials with glass stopples.

Hams.—The ham is one of the most valuable parts of the hog, and, if properly cured, may be preserved almost any length of time, retaining its fine qualities. The hams most esteemed are made from hogs which are allowed considerable exercise, and are fed on solid food, corn being the best—animals which do not weigh more than two hundred or two hundred and fifty pounds, and which have a large portion of muscular or lean flesh in their structure. When taken from the hog, the edges should be rounded off, or trimmed, and the first step in the preparation is the pickling or salting. To do this almost every farmer or butcher has his own way, some applying the salt dry to the ham, and repeating the operation of rubbing in until the requisite saltiness is attained, while others prefer making a brine and salting the hams in that way.

Each method has its advocates, and many of which do not essentially differ from each other. We shall give a few of the processes that have become the most noted, that the farmer may choose the one he shall deem most proper or convenient:

1. The Westphalian hams are much esteemed, and the pickle in which they are prepared is

essentially as follows: "Boil together over a gentle fire six pounds of good common salt, two pounds of powdered loaf sugar, three ounces of saltpeter, and three gallons of spring water. Skim it while boiling, and when quite cold pour it over the hams, every part of which must be covered with the brine. Hams intended for smoking will be sufficiently salted in this brine in two weeks; though if very large, more time may be allowed. This pickle may be used repeatedly, if boiled, and fresh ingredients added. Hams, before they are put in the pickle, should be soaked in water, all the blood pressed out, and wiped dry."

2. A correspondent gives the following, after twenty years practice: "I measure a bushel of salt, spread it upon a table, weigh a pound of saltpeter, pulverize it carefully, and mix thoroughly with the salt. This mixture is sufficient for one thousand pounds of small meat or eight hundred of large, to be well rubbed on every piece and more especially on the fleshy surface. If the weather is mild and the meat small, four weeks will be long enough for the pieces to be packed; but if the weather is cold and the meat large, it should be taken up at the end of four weeks, well rubbed again with salt in case the first has dissolved, and lie two weeks longer."

3. JOHN COCKRILL of Woodland, Alabama, in the *Southern Cultivator*, thus describes his method of curing hams: "My rule is to make a strong tea of red peppers, then to mix salt and hickory ashes, say one-fifth ashes; then moisten the mass with the pepper tea, and rub the hams and shoulders on the skin side with about a teaspoonful of saltpeter to each joint; I then rub in the salt well, then rub the flesh side and pack it with salt, and place the pieces in a trough or tub. I let it remain undisturbed for six weeks; when I knock off the loose salt, take fine pea meal, and rub it completely over the flesh side and hang it in the smoke-house. The meal will form a close crust and keep off the skipper fly"

4. The following is one of the easiest and most expeditious methods of curing and smoking hams, and we know makes a very respectable article. Take a good tight barrel, white oak is the best, take out one head, and invert it over a pan or kettle in which a smoke of hard wood chips, or cobs, is to be kept up for eight or ten days. Water must be kept on the head of the barrel to prevent it from drying. A pickle is made of six gallons of water, twelve pounds of salt, twelve ounces of saltpeter and

two quarts of molasses, dissolved together in a kettle, boiled, and the scum taken off. The hams are packed in the barrel, the brine, cold, is turned on to them, and in one week the hams are fit for use.

5. What is termed the Virginia mode, or in some places, the dry method of curing, as the hams do not lie in pickle at all, is as follows:

For each ham take a spoonful of saltpeter (a large tea-spoon will do), pulverize it finely and apply it; rub each piece with salt well on both sides, and pack them in hogsheds with holes bored in the bottom to let off the brine. Let them remain five or six weeks; then take them out, brush off the salt, rub each well with hickory ashes, and hang each piece in the smoke-house.

6. The celebrated pickle called the 'Empress of Russia's Brine, and much used in Europe for curing hams: Six pounds of common salt, two pounds of powdered loaf sugar, three ounces of saltpeter, and three gallons of spring water, are boiled together, skimmed, and when quite cold, poured over the meat, every part of which must be kept constantly covered. In this pickle hams of medium size are cured for smoking in two weeks.

7. "As soon as the hog is cold enough to be cut up, take the two hams and cut out the round bone, so as to have the ham not too thick; rub them well with common salt, and leave them in a large pan for three days. When the salt has drawn out all the blood, throw the brine away, and proceed as follows: Have two hams of about eighteen pounds each, take one pound of moist sugar, one pound of common salt, two ounces of saltpeter; then put them into a vessel large enough to contain them in the liquor, remembering always to keep the salt over them; after they have been in this state three days, throw over them a bottle of the best vinegar. One month is requisite for the cure of them; during that period they must be turned often in the brine; when you take them out, drain them well; powder them with some coarse flour, and hang them in a dry place. The same brine can serve again, observing that you must not put so much salt on the next hams that you pickle. This method has been tried, and pronounced far better than the Westphalia."

8. A French chemist strongly deprecates the use of saltpeter in curing meat, and recommends sugar as more wholesome and equally efficacious. He attributes scurvy, ulcers, and other diseases to which mariners, and other persons

living on cured provisions are subject, entirely to the chemical changes produced by saltpeter.

He calls attention to the fact that meat may be preserved in the most perfect manner by molasses alone. It has an agreeable flavor; it produces no scurvy, or other disorders which result from the use of salt food, and it may be prepared at a moderate price. The process consists simply in cutting the meat into pieces of moderate size, and dropping them into molasses, or rubbing them frequently and thoroughly with molasses, until some of the lighter juices of the meat pass out and the molasses is absorbed in their place. The ham, or meat, is then thoroughly washed and hung in a current of air to dry.

9. A farmer contributes his method of curing hams with dry sugar, as follows: "To cure a ham of fifteen pounds weight requires one pound of good brown sugar, two ounces refined and ground saltpeter, and a half pound ground sea salt. First application—saltpeter and cover the face of the ham with sugar a quarter of an inch thick; on the fifth day, rub the skin side with sugar. Second application—saltpeter and mixture of three parts sugar and one part salt; on the seventh day, rub as before. Third application—half sugar and half salt; in seven days, rub as before. Fourth application—same as last; in seven days, rub with sugar and salt. Fifth application—good molasses as long as the meat will absorb it." Weak stomachs, that reject salted hams, often find them palatable and delicious when cured with sugar.

Smoking Hams.—Much of the goodness of a ham depends on the manner in which it is smoked or dried. If the process is carried forward too rapidly; if the meat is not a sufficient distance from the fire; if, from any cause, such as want of ventilation, dampness of smoke-house, etc., the meat is kept moist on the surface, and in a wet or dripping state, it is idle to expect good or fine-flavored hams. In Virginia the best hams are not considered thoroughly smoked in less time than two months, not keeping a smoke under them day and night for this time, but making a good smoke under them every morning, or daily. In this way they are cured by the smoke gradually and thoroughly. Indeed, the great art in smoking seems to consist in drying the meat by the smoke and not by heat. Hams may be smoked in a much less time than this, but they will not be of as fine a quality, nor will they keep as well. Nothing but materials that will produce smoke free from all unpleasant odors should be used

for smoking hams. Hickory or maple are first-rate; oak or ash will do very well; and the cobs of sound, well-cured Indian corn make a good penetrating smoke. Hams are frequently injured by being too much exposed to too much heat in the process of smoking. To avoid this, at Hamburg, the smoking establishments, for both hams and beef, are in the upper stories of three or four-story buildings, and the fire for producing the smoke is in the basement part of the building. The smoke is conducted in tubes, and every precaution is used that the smoke shall be thoroughly cooled in its passage. In hanging up hams for smoking, care must be taken that they do not touch each other, and they should invariably be suspended so that the small part of the ham shall be down, as this will prevent the escape of the juice by dripping.

Smoke-houses should be so constructed that the smoke is admitted at the top of the building; the hams being near a dry floor, the smoke settles on the meat after being cooled. Hot smoke should never touch meat. Smoke very slowly, using green hickory, or seasoned corn-cobs, smothered with sawdust. Hickory, white oak, or maple sawdust is preferred. Sassafras fuel is said to render hams very savory. Pepper vines or red peppers thrown on the fire will warn off the bug and fly.

Keeping Hams.—Various methods have been recommended for the preservation of hams, such as packing them in cut straw, the tow of flax, ashes, fine charcoal, and many other ways. The great object is to keep them cool and dry, and away from flies. Tow will effectually exclude flies; charcoal assists greatly in preserving them sweet; and ashes secure their dryness; but all these plans are open to the objection of making the ham dirty, or leaving it liable to mold. A good method is to place each ham in a bag of cotton cloth, closely tied up and white-washed, and hung up in a close and dark smoke-house. Flies will not infest any place from which light is wholly excluded, and if a smoke is made under them once a week, it will greatly aid their preservation. Another mode is to bury them in oats or some other grain, but they are more apt to become injured from want of ventilation. Whatever mode is adopted, it is of vital importance that the work is done *early in the Spring, before the flies are stirring.*

The following is an excellent method: Make bags of unbleached cotton cloth, put the hams in, and then put in a layer of fine soft hay all around them, so as to make a stratum of hay

between the cloth and the hams. If merely bagged the flies will thrust their ovipositors through the cloth and sting the meat; but the interposed hay keeps them off, and if hung in a dry and cool place, the preventive will never fail. There is no method of keeping that is superior to this.

A Kentucky lady gives this as her way: "After hams have been smoked, take them down, thoroughly rub the flesh part with molasses, then immediately apply ground or powdered red or black pepper, by sprinkling on as much as will stick to the molasses, and rub some red pepper on the hock, when they must be hung up again to dry. Hams treated in this manner will keep perfectly sweet for two or three years."

To Keep Hams for Frying.—Some housewives, instead of preserving the ham whole, by any of the above methods, slice it up as if for cooking, remove the rind and the bones, and fry partially; then pack closely in a stone jar, from time to time pouring in the hot grease, to fill all the spaces and exclude the air. When the jar is full, cover with hot lard or the grease from the ham, and set away for use. When opened, the space made by taking out the meat should be filled with melted grease. Avoid the danger of molding by using no grease from which the water has not been thoroughly boiled. Some people pack the raw meat in the same manner—but experience indicates cooking to be the better way. Of course this only applies to hams intended for frying. Any housewife will appreciate the convenience of having the meat ready to put in the pan, when breakfast or dinner must come in a hurry.

Perhaps all of our readers are not aware that steak (pork and beef), sausages, puddings, etc., can be kept fresh the "year round" by frying and seasoning when fresh, the same as for the table, packing down in crocks or lard cans, and pouring hot lard over them, covering about one inch. When needed, scrape off the lard and heat through.

Packing Beef and Pork.—The usual method is to set a strong, clean, and well-hooped barrel under a beam in the cellar; then cut the meat into convenient pieces and pack it closely in layers on the edges, with salt and sugar or molasses in the bottom and between the layers. The meat should be pounded down so as to exclude the air. Many farmers use from half a bushel to a bushel of salt to a barrel—but this is quite too much; it tends to toughen the meat. One more reasonable farmer says: "For one

hundred pounds of beef, mix four quarts fine salt, four ounces saltpeter pulverized, and four pounds brown sugar." Another recommends: "Six quarts of good coarse salt is full enough for a barrel of family beef put down in the Fall, together with three-quarters of a pound of saltpeter, and three pints or two quarts of molasses. Repacking in the Spring used to be the old style, but it is unnecessary. It is surprising that one-half the people will throw on a bushel of salt for the purpose of making their beef as hard as a lapstone, when with no more expense it may be kept as tender as a fresh steak."

The *Country Gentleman* says: "By most of the modes now in use, the beef becomes too much impregnated with salt, and is not, as a consequence, so fine for eating. By the following process this difficulty is prevented, and the beef will keep till the following Summer: To eight gallons of water add two pounds of brown sugar, one quart of molasses, four ounces of niter, and fine salt till it will float an egg. This is enough for two common quarters of beef."

Cleansing or Renovating Brine.—To five gallons of brine, add one egg, broken and stirred in, and then bring to a gentle boiling and skim and cool for use. Saltpeter added to brine, at the rate of two to four ounces to the one hundred pounds of meat, gives it a fine reddish color. A little brown sugar adds to the flavor of beef and pork, particularly for smoking, besides possessing an antiseptic quality.

Bacon.—GEO. GEDDES recommends: "Next pig-killing season let any one try curing bacon, and I am sure they will never be without it in future. The trouble is not half so great. I will tell you just how mine was managed. I cut off the head and feet, then cut down the back and took out all the bones with as little meat to them as possible; shook pepper and sugar on these flitches, and then a good coating of salt (not rock). Put them on the floor of an unoccupied airy out-room, on a bench, or ought else would do, and looked them over once a week, shaking a little more salt where it seemed necessary, and at the end of six weeks smoked it, and now every part is delicious."

To Keep Meat Fresh.—MRS. L. A. MULLER says: "Take enough water to cover the meat, make it moderately salt, and to each bucketful of water—the common wooden bucket—take one large table-spoonful of sulphite of lime, and one tea-spoonful of saltpeter. It is all-important to keep every particle of meat under water by a press. Soak the meat in fresh water

over night, before using it, and it will be almost as good as fresh. I found veal kept in this way, at the end of six weeks, as good as when first butchered, and beef, at the end of ten weeks, fresh enough to make excellent soup and roasts. As the season advances, and the heat increases, use more of the sulphite."

Many a housewife may be glad to know when she has a piece of fresh meat she wishes to keep a few days, that it can be successfully done by placing it in a dish and covering it with buttermilk.

According to a recipe recently patented in England, meat of any kind may be preserved in any temperature after it has been soaked for ten minutes in a solution made of the following ingredients, well mixed: One pint of common salt dissolved in four gallons of clear cold water, and half a gallon of the bisulphite of calcium solution. It is said that experiments show that meats so prepared will keep for twelve days in a temperature of from eighty to one hundred and ten degrees, and preserve their odor and flavor unimpaired. By repeating the process, meats may be indefinitely preserved, and if it be desired to keep them an unusually long time, a little solution of gelatin or white of egg may be added to the wash.

To Keep Minced-Meat.—Mince-meat may be kept entirely sweet for months, at any time of year, by packing it in stone jars, and covering the surface with, say half an inch of molasses, to exclude the air.

To Restore Tainted Meat.—If salted, wash it and throw away the brine, then replace it with the following composition, and allow it to remain in it for a few days: Fresh burnt charcoal, powdered, twelve parts; common salt, eleven parts; saltpeter, four parts. Mix. This is to be used the same as common salt. When the meat is to be cooked, the black color may be removed with clean water.

Pickled beef and pork in the South and West is apt to sour. Take it out and smoke it dry; throw away the old pickle or cleanse it by boiling; smoke the barrel thoroughly and repack the meat.

Souse.—Clean pig's feet and ears thoroughly, and soak them a number of days in salt and water; boil them tender and split them. They are good fried. To *souse* them cold, pour boiling vinegar over them, spiced with mace and pepper-corns. Cloves give them a dark color, but improve their taste. If a little salt be added, they will keep good, pickled, for a month or two.

Head-Cheese.—Boil the several parts of the entire head and the feet in the same way as for souse. All must be boiled so perfectly tender as to have the meat easily separate from the bones. After neatly separated, chop the meat fine while warm, seasoning with salt, pepper, and other spices to taste. Put it in a strong bag, and, placing a weight on it, let it remain till cold. Or put it in any convenient dish, placing a plate with a weight on it to press the meat. Cut it in slices, roll in flour, and fry in lard.

To Try Out Lard.—To have sweet lard at all times, let the pork be cut up just as soon after killing as possible; render it without water, and be sure you cook it till well done; pack it in stone jars, or sweet oak tubs. Adding to every ten pounds of rough lard a table-spoonful of saleratus during the process of trying out.

Lard, in trying, is very frequently injured by being scorched. This difficulty is easily removed by paring and slicing a few raw potatoes, and throwing them in immediately. The original whiteness will be restored. Lard will not be likely to spoil in warm weather, if it be cooked enough in trying out.

To Restore Rancid Lard.—Pot skimmings, rancid lard, or bacon fat, may be made sweet by being put into a kettle, adding two or three potatoes, pared and sliced, and letting them fry in the grease until they are browned. Your grease or lard will then be free from all unpleasant taste, and suitable for shortening, or to fry doughnuts in.

Tripe.—Marketable tripe is the paunch, or large stomach of beef, taken fresh, cleansed thoroughly and boiled until it is tender. The contents should be carefully emptied through a hole in the side, and turned wrongside out. The orifice should afterward be sewed up, and the whole sack thoroughly washed in cold water. It should then be soaked in milk of lime, made by slaking quicklime to a creamy consistence; or else placed in a tub of strong alkali, made of lime, or wood ashes, or potash, and kept there until all the dark-colored coating is so loosened that it may easily be scraped off with a knife. Give the sack another thorough washing; then cut into long strips, lay them on a board and scrape with a dull knife until quite free of the adhering coat. Wash again; put the tripe to soak in weak brine for a day or two; boil until quite tender, pickle in salt and spices, and put away to be eaten fresh after re-cooking by stewing, frying or broiling. Tripe is a rare dainty for all those who know how to save it and how to cook it.

Preserve Udders.—Don't throw away the udder of your beef cow; salted, smoked, and dried, it is rich, delicious eating. Boil and eat it cold, like tongue.

To Pickle Tongues.—Cut off the root leaving a little of the kernel and fat. Sprinkle some salt over it, and let it drain twenty-four hours; then for each tongue mix a table-spoonful of common salt, the same quantity of coarse sugar, a small quantity of saltpeter reduced to a powder, and rub it well into each tongue every day. In a week add another heaped spoonful of salt. If rubbed every day, a tongue will be sufficiently pickled for drying in a fortnight; but if only turned daily in the pickle, it will require four or five weeks. Tongues may be smoked or dried plain, as may best suit the taste. The longer kept after drying, the higher will be their flavor. If hard, they should be soaked three or four hours before boiling. When dressed, allow five hours for boiling, as their excellence consists in being made exceedingly tender.

Sausages.—The following is a general receipt for the proper seasoning of sausages—much better than the old clumsy method of “testing and trying.” To thirty pounds of meat add ten ounces of fine salt, three ounces of sage, two ounces good black pepper, a little cinnamon, and mix them well together. The sage should be well rubbed between the hands, or through a sieve, before using. After the ingredients are thoroughly incorporated, apply them to all parts of the meat, before chopping. Some add a little more salt, but this proportion is enough for most people.

That efficient little machine, a sausage cutter is almost as necessary to the housewife who would have good sausages, as a coffee-mill is if she would have good coffee. Select the tenderloins and tender pieces from hogs, at the time of cutting up for salting; take one-fourth (or a third if the hogs are not very fat) of the backbone fat, and cut it with the lean, and incorporate the fat and lean thoroughly. The proportion of fat meat to lean will depend somewhat on the taste of different people, but there should in all cases be a sufficient amount of fat in them to supply what is needed in cooking. If the pork you design for sausage contains too little lean, you can supply the deficiency by adding beef, which is less expensive, and which forms with the pork a mixture which is preferred by many to pork alone.

Pass the meat twice through a sausage-mill;

chop the fat very fine with a cleaver, for grinding reduces it to a paste, and it is lost in frying.

Sausage to suit a dyspeptic can not be prepared without stuffing. The small entrails of hogs must be well cleaned and scraped until all the fat is removed, turned and soaked in brine twenty-four hours; pour over the meat hot red-pepper tea with a little saltpeter dissolved in it, sufficient to moisten the mass; then stuff and hang in a smoke-house, and smoke two days with cobs or hickory wood; be careful not to smoke for more than two days.

If you do not like it smoked, it need not be stuffed, but can be satisfactorily prepared by molding into balls the size of an egg, and then laying in jars, covering with melted lard, and tying closely down with strong paper, till used.

Another way to preserve sausage meat is in new cotton bags a foot long and two or three inches in diameter, which after filling are dipped in and coated with melted lard. When used, the bag is sliced off with the meat, as it is much easier to make new ones than to preserve the old.

Now for cooking. Flour the outside of the cakes and fry without anything; perhaps after they get a little dry, a piece of fat pork may be needed. The main art and secret of sausage making is to proportion the seasoning so that no one article will predominate. Some prefer other herbs besides sage, such as Summer savory and thyme, and there are a few who relish spices of various kinds; but where sausages are to be made to suit the tastes of several persons, we must be careful not to add any substance that will offend the taste of any one.

Veal Sausages.—Take two pounds of lean veal and one pound of salt fat pork; chop or grind as you would sausage meat; add salt, pepper, sage, etc., and you will have delicious sausages, far preferable to pork or veal cooked separately.

Mutton Sausages.—Take a pound of the rawest part of a leg of mutton that has been either roasted or boiled; chop it small, and season it with pepper, salt, mace, and nutmeg; add six ounces of beef-suet, some sweet herbs, and a pint of oysters (all chopped very small), a quarter of a pound of grated bread, and the yolks and whites of two eggs well beaten. Put it all, when well mixed, into a little pot; and use it by rolling it into balls or sausage-shape, and frying.

Beef Sausages.—Very good sausages can be made by cutting together beef and suet, in the

proportion of two of beef to one of suet, seasoning as above.

Bologna Sausages.—Take equal quantities of bacon, fat and lean, beef, veal, pork, and beef-suet; chop them small, season with pepper, salt, etc., sweet herbs and sage rubbed fine. Have a well-washed intestine, fill and prick it; boil gently for an hour, and lay on straw to dry. They may be smoked the same as hams.

To Preserve Suet.—As soon as it comes in, choose the firmest part of it; carefully separating all the skin and veins, and putting it in a sauce-pan at such a distance from the fire as to melt it slowly without frying. When in a hard cake, wipe it quite dry, fold it in fine paper, put it in a bag, and keep it in a cool place, and it may be preserved in a sound state for a year.

Milk.—*To Keep Sweet.*—A tea-spoonful of fine salt or of horse-radish, in a pan of milk, will keep it sweet for several days.

Milk can be kept a year or more as sweet as when taken from the cow, by the following method: Procure bottles, which must be perfectly clean, sweet and dry; draw the milk from the cow into the bottles, and, as they are filled, immediately cork them well, and fasten the corks with pack-thread or wire. Then spread a little straw in the bottom of a boiler, on which place bottles, with straw between them, until the boiler contains a sufficient quantity. Fill it up with cold water, heat the water, and, as soon as it begins to boil, draw the fire, and let the whole gradually cool. When quite cold, take out the bottles, and pack them in sawdust, in hampers, and stow them in the coolest part of the house.

Butter.—Under the head of The Dairy, we have treated milk, butter, and cheese in detail; we only return to them in order to state more explicitly some methods of preserving. "Make clean butter;" this is the first condition of keeping butter sweet.

To Harden Butter in Summer.—A simple mode of making butter hard in warm weather, where ice is not handy, is to invert a common flower-pot over the butter, with some water in the dish in which the butter is laid. The orifice at the bottom may be corked or not. It will be still cooler if the crock be wrapped with a wet cloth. The rapid abstraction of heat by external evaporation causes the butter to become hard.

To Pot Butter for Winter.—The usual method is to pack it in stone jars, with alternate layers of salt and butter, having salt at the bottom of the jar and a layer of salt at the top; rock salt is the best. The following is said to be a superior mode of keeping butter sweet: Mix a large spoonful of powdered white sugar, one of saltpeter, and one of salt; work this quantity into every six pounds of fresh-made butter; put it in a stone pot that is thoroughly cleansed, having a thick layer of salt on top.

To Keep Butter Fresh for Years.—"Most kinds of wood contain considerable quantities of pyrogenous acid, which decomposes salt in butter kept in such tubs. The lindep, or basswood is the only one, which, it appears by careful experiment, is free from it; others, it is stated, may be freed from it, and thus rendered suitable, by boiling three or four hours, well pressed under water. Good butter is to be well churned, and worked, and packed hard and tight in kegs of seasoned white oak; the head is then put in, leaving a small hole into which brine is poured to fill the vacant space; and of so much importance is it deemed, to prevent any bad taste, that the plugs for the hole must not be made of cedar or pine, but of cypress or basswood, as otherwise it would be injured. After which these kegs are placed in a hog-head, well filled with brine of solution, that will bear an egg, which is then headed up tight and close. This is the mode pursued in Orange county, New York, and the butter will keep at sea, and, in warm climates, and commands a very high price."

The farmers of Aberdeen, Scotland, are said to practice the following method of curing their butter, which gives it a great superiority over that of their neighbors: "Take two quarts of the best common salt, three ounces of sugar, and one ounce of common saltpeter; take one ounce of this composition for one pound of butter, work it well into the mass, and close it up for use. The butter cured with this mixture appears of a rich marrowy consistency and fine color, and never acquires a brittle hardness nor tastes salty. Dr. Anderson says: 'I have eaten butter cured with the above composition that has been kept for three years, and it was as sweet as at first.' It must be noted, however, that butter thus cured requires to stand three weeks or a month before it is used."

This mode of saving butter with saltpeter and sugar is much in vogue in this country; and is especially valuable for making a brine, in the proportions of two parts salt to one of

salt-peter and one of sugar, for laying down for Winter use butter that has been worked over.

To Sweeten Rancid Butter.—There are two methods of successfully purifying rancid butter so as to make it nice for the table.

1. Cut or break the butter into very small pieces; or, what is better, force it through a coarse-wire sieve, so as to make it small as possible. Then put it into a churn with a sufficient quantity of new milk to swim it, and churn it well; then take it out and work it thoroughly to free it from the milk, adding a little salt if necessary, and it will hardly be distinguished from entirely new butter.

2. To a pint of water add thirty drops (about half a tea-spoonful) of liquor of chloride of lime. Wash in this two and a half pounds of rancid butter. When every particle of butter has come in contact with the water, let it stand an hour or two, then wash the butter well again in pure water. The butter is then left without any odor, and has the sweetness of fresh butter. These preparations of lime have nothing injurious in them.

Cheese.—*To Keep Sound.*—Wash it in warm whey once a month, wipe it, and keep it on a rack; if you wish it to ripe keep it in a damp cellar, which will bring it forward. When a whole cheese is cut the largest piece should be spread on the inside with butter, and the outside wiped dry to preserve it; and to keep that which is in daily use moist, let a clean cloth be wet and wrapped around it when taken from the table.

Cottage Cheese, or Smear Case.—Pour over a crock or pan of thick milk sufficient boiling water to cover the surface; let it stand half an hour in a warm place or until the whey begins to separate, then pour it into a thin muslin bag and hang it up in as cold a place as possible without freezing, until the water and whey are strained off. In Winter this cheese can be kept from one day to the next; but in Summer it spoils before the next meal. The milk must be thick, but not old. If left standing until the whey separates from the curd before scalding, the cheese will be stale. The milk should not be stirred before scalding.

Potato Cheese.—Boil good white potatoes, peel them, and when cold, mash them until not the least lump remains. To five pounds of this add one pint of sour milk, and as much salt as you think suitable. Work it well, and cover it well, letting it remain three or four days, ac-

ording to the season; then knead it again—make the cheese the size you like, and dry them in the shade. Put them in layers in large pots or kegs, and let them remain for a fortnight. They will be good for years, if kept in close vessels in a dry place.

Cream Cheese.—Put about a tea-cupful of thick cream on a folded napkin, place on a tea-saucer. As soon as it is firm enough turn it over upon another napkin. Repeat three times, at intervals of about six hours. Serve with parsley and rub salt outside.

Eggs.—The changes which eggs undergo, arising chiefly, if not wholly, from absorption of air through the shell, the means of preservation must be similar to those we have seen necessary in so many other instances. To accomplish exclusion of air, some pack the eggs standing on the small end, in corn meal, others in lime water, others in brine. These last two methods are effectual for a considerable time, but the most successful means is to cover the egg with fat or oil or butter. Thus prepared, a newly-laid egg will remain six months without perceptible change. Salt and lime are apt to cook the eggs somewhat, but they emerge from their greasy coat as fresh as when they received it.

A great point made by many is to have the egg stand on end—some housekeepers are very sure that it is quite indispensable that the small end should be down; others are equally sure that they should rest on the large end. Both are very successful. They may be packed in oats, dry sawdust, or any other material that will hold them in this position. They should be kept in a cool, dry room. The philosophy of standing them on end is that it keeps the yolk from settling against the shell.

The *Northwestern Farmer* gives the following process: "Take a sieve, and cover the bottom with eggs; then pour boiling water upon them, sufficient to give them a thorough wetting, permitting the water to pass off through the sieve. Take them out and dry them; then pack them in bran, the small ends down; and your eggs will keep forever." This method coagulates a thin film of the white next the shell, and renders it impervious to the air, which is the cause of the putrefactive stage—the shell being porous, and by laying a short time in one position, the yolk displaces the white and comes in contact with it and spoils.

Dipping eggs in a solution of gum-arabic will preserve them effectually; pack in pulverized

charcoal or grain. Eggs can be kept two or three years by being rubbed with a warm pomade—one part beeswax and two parts sweet oil.

Eggs can be canned like fruit; put the empty jar in hot water to rarify the air; pack the eggs in paper shavings within, and close air tight before removing from the water.

Testing the Quality.—Put your tongue to the larger end; if it feel warm the egg is fresh; or put the egg into a pan of cold water; if perfectly fresh it will sink immediately, and so in proportion to its freshness; a rotten egg will float on the top of the water. Or, look through at a light—if good, it will be translucent.

Pickled Eggs.—Boil the eggs until very hard; when cold, shell them and cut them in halves lengthways. Place them carefully in large-mouthed jars, and pour over them scalding vinegar, well seasoned with whole pepper, allspice, a few pieces of ginger, and a few cloves or garlic. When cold, tie up closely, and let them stand a month. They are then fit for use. With cold meat, they are a most delicious and delicate pickle.

Packing Eggs.—An Eastern poultry-breeder packs eggs by wrapping each egg in paper, putting them in a box with sawdust, and putting this box inside of a larger one, with hay packed around it to keep it from jarring. Good for long carriage

Honey.—*To Keep.*—Heat strained honey to the boiling point and store it in covered jars, where it will keep without candying. To prevent danger of burning, set the vessel in which it is to be heated into another containing water.

To Separate from the Comb.—Put the honey, comb and all, in a tin pan, on or in a moderately warm stove, adding to each pound of honey a table-spoonful of water. Stir it occasionally with a piece of wire; if anything large is used there will be an accumulation of dirty cold wax continually added to the hot mass. When the contents of the pan are perfectly liquid—it must not boil—set it where it can cool undisturbed. Then take a knife and pass it carefully around the pan to detach the cake of wax, etc., on the top, and rapidly, with great care, lift off the cake. Don't let it drain into the pan an instant, but place in another utensil. Any one thus clarifying honey will find, on putting aside the cake of wax, that every particle of impurity that would have to be strained from the honey, will have adhered to the cake of wax, and nothing remains beneath but the golden-colored honey, clear as water. If the

honey should, in time, candy, heat it again with a very little water and white sugar. Keep in jars, tied up, in a cool place. Break up the wax cake and wash in cold water till cleansed from the honey. Then melt and strain it. To bleach the wax, boil it, after straining, for an hour, in plenty of water, in which use a few drops of chloride of soda. When quite cold, lift off the wax and leave it to dry and whiten in the open air.

Some prefer to strain the honey as follows: Make a strainer of cloth, then pick out every dead bee, break up the comb, put into the strainer, tie a loop at the top, and hang it near by the stove, with a small-topped vessel under it to catch the honey in. In this way the honey will be nice. To restore candied honey, let it be boiled and the scum removed.

To Purify Honey.—Expose the honey in a wooden or other vessel that is not a good conductor of heat, in a place where neither sun or rain can touch it, for three weeks. The honey is not coagulated, but becomes clear.

Artificial Honey.—Put two pounds of the purest white sugar in as much hot water as will dissolve it; take one pound of strained white-clover honey—any honey of good flavor will answer—and add it warm to syrup, thoroughly stirring them together. As refined loaf sugar is a pure and inodorous sweet, one pound of honey will give its flavor to two pounds of sugar, and the compound will be free from the smarting taste that pure honey often has, and will usually agree with those who can not eat the latter with impunity.

How to Clarify Fat.—In every household more or less fat of various kinds will accumulate, which can not be used in cookery from its being mixed with foreign substances, as for instance the fat after frying sausages, or the fat from mutton. To every quart of such fat, peel and slice one good-sized raw potato; place the fat over the fire and put in the potato, and cook until the potato is cooked all up to a scrimp; then remove from the fire, skim out the potato and throw it away; let it settle and pour off the clear fat, which will be quite as sweet and inodorous as fresh lard, and can be used for any purpose that lard may be used.

To Keep Fish Fresh.—To keep fish fresh, clean them and remove the gills; insert pieces of charcoal in their mouths and bellies; if they are to be conveyed any distance, wrap each fish up separately in linen cloth, and place them in a box with cabbage leaves above and below.

To Purify Molasses.—Boil and skim your

molasses before using it. When applied for culinary purposes, this is a prodigious improvement. Boiling tends to divest it of its unpleasant, strong flavor, and renders it almost equal to honey. When large quantities are made use of, it is convenient to prepare several gallons at a time.

Table Turnips for Winter.—Any one wishing to keep a few turnips for table use, fresh and plump as when taken from the ground, should throw a little not overmoist dirt over them, in some convenient place in the cellar. Try it, ye who love a tender, rather than a pithy, sticky dish of turnips for your dinner.

To Keep Maple Syrup.—The *Ohio Farmer* says the best way to keep the syrup from losing flavor is to seal it up hot in cans, the same as fruit is sealed in the Fall. In the Spring of the year many of the fruit cans are empty, and can be used for this purpose. Put up in this way, maple syrup will keep perfectly and retain that nice flavor it has when first made, but which is lost in a few months, if kept in ordinary jugs or casks.

To Purify a Sink.—In hot weather it is almost impossible to prevent sinks becoming foul, unless some chemical preparation is used. One pound of copperas dissolved in four gallons of water, poured over a sink three or four times, will completely destroy the offensive odor. As a disinfectant agent to scatter around premises affected with any unpleasant odor, nothing is better than a mixture of four parts dry ground plaster of Paris to one part of fine charcoal, by weight. All sorts of glass vessels and other utensils may be effectually purified from offensive smells by rinsing them with charcoal powder, after the grosser impurities have been scoured off with sand and soap.

To Cleanse Water.—If a lump of alum as large as the thumb-joint is thrown into four or five gallons of boiling soap-suds, the scum runs over and leaves the water clean and soft and useful for washing. We have often, in ancient times, "settled" a glass of Mississippi water, and made it look as "clear as a bell" in a few seconds, by tying a bit of alum to a string and twirling it around under the surface of the water in the glass. A little pulverized alum thrown into a pail of water and allowed to stand for fifteen or twenty minutes will precipitate all the impurities, and leave it perfectly clear.

To Extinguish Chimneys on Fire.—First shut the doors and windows of the room containing the fire, stop up the flue of the chimney with a

piece of wet carpet or blanket, and then throw a little water or common salt on the fire. By this means the draught of the chimney will be checked, and the burning soot will soon be extinguished for want of air.

To Remove the Taste of New Wood.—A new keg, churn, bucket, or other wooden vessel, will generally communicate a disagreeable taste to any thing that is put into it. To prevent this inconvenience, first scald the vessel with boiling water, letting the water remain in it until cold; then dissolve some pearlsh or soda in lukewarm water, adding lime to it, and wash the inside of the vessel well with this solution. Afterward scald it well with plain hot water, and rinse it with cold water before you use it.

The "Poor Man's Filter."—In the food department of the South Kensington Museum stands the "poor man's filter." It is an ordinary flower-pot, plugged (not tightly) at the bottom with sponge. A layer of coarsely-powdered charcoal, about one inch thick, is placed in the bottom of the pot, then another layer of sand of the same thickness, then pebbles, coarse gravel, and stones are placed on the whole. This forms an admirable filter, and one within the reach of the poorest.

To Make Ice.—“A mixture of four ounces of subcarbonate of soda, four ounces of nitrate of ammonia, and four ounces of water, in a tin pail, will produce eight or ten ounces of ice in three hours,” in Summer time. Indeed, there is a little machine exhibited at State fairs that manufactures ice *ad libitum* with the thermometer at 85°. It is more expensive than an ice-house, though.

How to Open Soda Water, Champagne, etc.—“In opening a bottle of soda water there is generally a waste of liquid at the moment the cork flies out, in consequence of the retroactive motion of the bottle. This may be prevented (unless the liquid be very highly charged with gas) by resting the bottle firmly and uprightly on a solid support while removing the cork.”

To Make Water Cold in Summer.—The following is a simple mode of rendering water almost as cold as ice: Let the jar, pitcher, or vessel used for water be surrounded with one or more folds of coarse cotton, to be constantly kept wet. The evaporation of the water will carry off the heat from the inside, and reduce it to a freezing point. In India and other tropical climes, where ice can not be procured, this mode of cooling water is common. Let every one have at his place of employment two pitchers thus provided, and with lids or covers,

one to contain water for drinking, the other for evaporation, and he can always have a supply of cold water in warm weather. Any person can test this by dipping a finger in water, and holding it in the air on a warm day; after doing this three or four times he will find his finger uncomfortably cold.

Management of Gold Fish.—Gold fish may be kept ten or twelve years in vessels (their average period of existence) by the following precautions: 1. Allow not more than one fish to a quart of water, whether spring or river water, and change it every other day in Summer, every third day in Winter. 2. Use deep rather than shallow vessels, with small pebbles at the bottom (to be kept clean), and keep them always in the shade and in a cool part of the room. 3. Use a small net rather than the hand while changing the water. 4. Feed with cracker, yolk of egg, rice paper, lettuce, flies, etc., rather than with bread, and then only every third or fourth day, and but little at a time. 5. Do not feed them much from November to the end of February, and but little more during the three following months. 6. In frosty weather the water should be drawn and allowed to stand a while in a room where there is a fire, before placing the fish in it; this takes the chill off the water, which might kill the fish.

Vermin in Bird-Cages.—Many a person has watched with care and anxiety a pet canary, goldfinch, or other tiny favorite, evidently in a state of perturbation, plucking at himself continually, his feathers standing all wrong, always fidgeting about, and in every way looking very seedy. In vain is his food changed, and in vain is another saucer of clean water always kept in his cage, and all that kindness can suggest for the little prisoner done; but still all is of no use, he is no better—and why? Because the cause of his wretchedness has not been found out, and until it is, other attempts are but vain.

If the owner of a pet in such difficulties will take down the cage and cast his or her eyes up to the roof thereof, there will most likely be seen a mass of stuff, looking as much like red rust as anything; and from thence comes the cause of the poor bird's uneasiness. The red rust is nothing more nor less than myriads of parasites infesting the bird, and for which water is no remedy. There is, however, a remedy, and one easily procurable in a moment—fire. By procuring a lighted candle and holding it under every particle of the top

of the cage till all chance of anything being left alive is gone, the remedy is complete.

An equally effectual remedy will generally be found in placing a clean white cloth over the cage at night; in the morning it will be covered with the vermin.

Seeds for Canaries.—Persons having pet canaries, will find that they are extravagantly fond of the seed produced from the plantain, which may be found in almost every yard, the leaf of which is known to every school-boy, as an excellent remedy for the effects of a bee sting. The birds will eat these seeds voraciously, when they appear to have a decided distaste to every other kind of food offered them.

Domestic Hints.—Rich cheese feels soft under the pressure of the finger. That which is very strong is neither good nor healthy. To keep one that is cut, tie it up in a bag that will not admit flies, and hang it in a cool, dry place. If mold appear on it, wipe it off with a dry cloth.

Flour and meal of all kinds should be kept in a cool, dry place, and in cloth bags rather than in wood.

To select nutmegs, prick them with a pin. If they are good, the oil will instantly spread around the puncture.

Keep coffee by itself, as its odor affects other articles. Keep tea in a close chest or canister.

Oranges and lemons keep best wrapped close in soft paper, and laid in a drawer of linen.

Bread and cake should be kept in a tin box or stone jar.

Soft soap should be kept in a dry place in the cellar, and should not be used till three months old.

Bar soap should be cut into pieces of a convenient size, and laid where it will become dry. It is well to keep it several weeks before using, as it spends fast when it is new.

It is a good plan to keep your different kinds of pieces, tape, thread, etc., in separate bags, and there is no time lost then in looking for them.

The water in flower pots should be changed every day in Summer, or it will become offensive and unhealthy, even if there is salt in them.

Do not wrap knives and forks in woollens; wrap them in good strong paper. Steel is injured by laying in woollens.

Two gallons of fine charcoal will purify a dozen hogsheads of water, when the smell is so unpleasant it can not be used.

It is a good plan to put new earthenware into cold water, and let it heat gradually until it boils, then cool it again. Brown earthenware, particularly, may be toughened in this way. A handful of rye or wheat bran thrown in while it is boiling, will preserve the glazing so that it will not be destroyed by acid or salt.

Wash your tea-tray with cold suds, polish with a little flour, and rub with a dry cloth.

When walnuts have been kept until the meat

is too much dried to be good, let them stand in milk and water eight hours, and dry them, and they will be fresh as when new.

A hot shovel held over varnished furniture will take out white spots.

Frozen potatoes make more starch than fresh ones; they also make nice cake.

Odors from boiling ham, cabbage, etc., are prevented by throwing red pepper-pods, or a few pieces of charcoal into the pot.

THE KITCHEN AND DINING-ROOM.

WHAT TO EAT AND HOW TO COOK IT; AND THE SANITARY CONDITIONS OF DIET.

EATING is an essential of human life. We can not live long without it, nor can we enjoy good health without proper food. "The stomach," says Dr. KITCHINER, "is the main-spring of our system; if it be not sufficiently wound up to warm and support the circulation, the whole business of life will, in proportion, be ineffectually performed. We can neither think with precision, walk with vigor, sit down with comfort, nor sleep with tranquility. It influences all our actions."

In the earlier ages of the world, the common people at least lived in the simplest manner. At the commencement of the Christian era, a few fruits and vegetables, oils and wines, meats and wild honey, constituted the limited supply of food to meet the wants of man. In the fourteenth century, the British Parliament fixed the price of eggs at half a penny a dozen, a pair of chickens at a penny, a sheep at one shilling and sixpence, a fat hog at three shillings and fourpence, and a fat ox at sixteen shillings, yet one half the common people, three centuries later, ate animal food only twice a week, while the other half ate none at all, or at most not oftener than once a week. In the reign of CHARLES I., we are told that soup, made of snails, would grace the table, together with a powdered goose, a hedgehog pudding, a cow's udder roasted, a rabbit stuffed with oysters, a mallard with cabbage, a spinach tart, a pie of alves' eggs in moonshine—whether boiled or fried in that substance, the ancient chronicles saith not.

But coming down to our own time, two centuries later, we find a wonderful change has been effected. Snail soup and hedgehog pudding no longer suffices for even the humblest of the people. Human food and comforts have multiplied a thousand-fold. How to prepare this food so as to best administer to the nourishment and comfort of the human system, if taken

in a reasonable and proper manner; or how, on the other hand, to prepare it so as to lessen the pleasure of eating it, and the benefits which we should otherwise derive from its use, are questions of no small moment to all classes of society.

"Among all the arts known to man," says LIEBIG, "there is none which enjoys a juster appreciation, and the products of which are more universally admired, than that which is concerned in the preparation of our food." To say nothing of the deleterious effects of illy-prepared food, millions annually are wasted in our land, for want of a proper knowledge of domestic cookery.

The proper supply of food and its quality, is one of the most important subjects that come under consideration. If it contain too much nutriment it clogs and overloads the digestive organs, and is productive of a formidable class of diseases; if deficient in nutriment, the muscles become soft and flabby, the strength fails, and if longer continued emaciation and death ensues. The food, then, to produce its proper effect must possess two conditions; one is, that of sufficient bulk to keep the stomach properly distended, without which its functions are impeded; and the other, that of sufficient nutriment or substance that can be converted into chyle and appropriated to the repair of wear and tear of the system. The best food for man is that in which these conditions are best united. Pure wheat flour has too much nutriment for the health of man.

Bran is a very nutritive substance. Though it doubtless contains from five to six per cent. more ligneous substances than flour, it presents more nitrogenous matter, twice as much fatty matter, and moreover two distinct aromatic principles, one of which possesses the fragrance of honey, and which are both wanting in flour. Therefore bran and meal ought to be ground over again and mixed with the pure

flour, for this mixture yields a superior kind of bread. Plain, common food, in which the extremes of bulk and nutrition are avoided, is doubtless the most conducive to health, and those that subsist upon such, are the best able to labor, or endure severe exercise.

In the torrid regions, the people subsist on fruits and vegetables—in the frigid regions, mostly on meats and oils; but in our temperate latitudes a judicious use of both vegetable and animal food seems necessary to the comfort and health of man. When the system has long been exclusively habituated to either a vegetable or animal diet, scurvy intervenes if that habit be suddenly changed from one to the other—no matter which. As the human body is composed of many parts or principles, each differing from the other in composition and chemical properties, it is quite obvious that the system should be supplied with food containing all the elements which enter into its composition. A considerable variety of food becomes necessary to meet all these demands.

As vegetables alone can not produce in sufficient quantity the cellular tissue and membranes, of the brain and nerves, other kinds of food are necessarily required. MAGENDIE has clearly shown, by ample experiments, that man requires a variety of articles of diet, and the appetite in its cravings and necessities confirms this conclusion.

Much of the value of food depends on the ease with which it can be digested and applied to the purposes of nutrition. Dr. WILLIAM BEAUMONT wrote a work on the Gastric Juice and the Physiology of Digestion, founded on experiments and observations on the living stomach of ALEXIS ST. MARTIN, a young Canadian of eighteen, who by a gun-shot, in 1822, at Mackinaw, had an opening made in his stomach, which never fully healed, leaving an orifice so large that all the processes of digestion could be examined after he was restored to perfect health. Those experiments continued several years, furnish our best guide concerning the digestion of the principal articles of human food; yet, it should be added, these are but approximations, for the rapidity of digestion varies greatly according to the quantity and quality eaten, the amount and nature of the previous exercise, the interval since the preceding meal, the state of health and of the weather, and also the state of the mind. If the food is made fine, or cooked, when taken into the stomach, the nutritive power is much increased.

We give Dr. BEAUMONT's table, showing the time requisite for digestion, with the addition, in some cases, of the relative amount of nutriment in the several articles:

ARTICLES OF DIET.	How prepared.	Mean time of Chymification.	Per cent of Nutriment.
		Hours.	
Cucumbers.....	Boiled	1.00	3
Rice.....	Boiled	1.00	92
Pigs' feet, soured.....	Boiled	1.00	...
Tripe, soured.....	Boiled	1.00	...
Eggs, whipped.....	Raw	1.30	...
Trout, salmon, fresh.....	Boiled	1.30	...
Trout, salmon, fresh.....	Fried	1.30	...
Soup, barley.....	Boiled	1.30	...
Apples, sweet, mellow.....	Raw	1.30	10
Venison steak.....	Boiled	1.35	22
Brains, animal.....	Boiled	1.45	...
Sauzo.....	Boiled	1.45	88
Tapioca.....	Boiled	2.00	...
Bird, sucking.....	Boiled	2.00	84
Milk.....	Boiled	2.00	13
Liver, beef's, fresh.....	Boiled	2.00	...
Eggs, fresh.....	Raw	2.00	...
Codfish, cured dry.....	Boiled	2.00	...
Apples, sour, mellow.....	Raw	2.00	...
Cabbage, with vinegar.....	Raw	2.00	...
Milk.....	Raw	2.15	7
Eggs, fresh.....	Roasted	2.15	...
Turkey, wild.....	Roasted	2.18	...
Turkey, domestic.....	Boiled	2.25	...
Gelatine.....	Boiled	2.30	...
Turkey, domestic.....	Roasted	2.30	...
Goose, wild.....	Roasted	2.30	...
Pig, sucking.....	Roasted	2.30	...
Lamb, fresh.....	Boiled	2.30	...
Hash, meat, and vegetables.....	Warmed	2.30	...
Beans, pod.....	Boiled	2.30	86
Cake, sponge.....	Baked	2.30	...
Parasnis.....	Boiled	2.30	...
Potatoes, Irish.....	Roasted	2.30	26
Potatoes, Irish.....	Baked	2.30	...
Cabbage, head.....	Raw	2.30	7
Spinal marrow, animal.....	Boiled	2.40	...
Chicken, full grown.....	Fricasseed	2.45	27
Custard.....	Baked	2.45	...
Beef, with salt only.....	Boiled	2.45	...
Apples, sour, hard.....	Raw	2.50	...
Oysters, fresh.....	Raw	2.55	...
Eggs, fresh.....	Soft boiled	3.00	...
Bass, striped, fresh.....	Boiled	3.00	20
Beef, fresh, lean, rare.....	Roasted	3.00	29
Beefsteak.....	Boiled	3.00	...
Pork, recently salted.....	Raw	3.00	...
Pork, recently salted.....	Stewed	3.00	...
Mutton, fresh.....	Boiled	3.00	...
Mutton, fresh.....	Boiled	3.00	...
Soup, bean.....	Boiled	3.00	...
Chicken soup.....	Boiled	3.00	...
Pumpkin, apple.....	Boiled	3.00	...
Cake, corn.....	Baked	3.00	...
Oysters, fresh.....	Roasted	3.15	...
Pork, recently salted.....	Boiled	3.15	...
Pork steak.....	Boiled	3.15	...
Mutton, fresh.....	Roasted	3.15	20
Bread, corn.....	Baked	3.15	80
Carrot, orange.....	Boiled	3.15	13
Sausage, fresh.....	Boiled	3.20	...
Flounder, fresh.....	Fried	3.30	...
Catfish, fresh.....	Fried	3.30	...
Oysters, fresh.....	Stewed	3.30	...
Beef, fresh, lean, dry.....	Roasted	3.30	26
Beef, with mustard, etc.....	Boiled	3.30	...
Butter.....	Melted	3.30	96
Cheese, old, strong.....	Raw	3.30	...
Soup, mutton.....	Boiled	3.30	...
Sugar and syrups.....	Raw	3.30	96
Oyster soup.....	Boiled	3.30	12
Bread, wheat, fresh.....	Baked	3.30	80
Turkey, fresh.....	Boiled	3.30	11
Potatoes, Irish.....	Boiled	3.30	28
Eggs, fresh.....	Hard boiled	3.30	...
Eggs, fresh.....	Fried	3.30	...
Succotash.....	Boiled	3.45	...
Beets.....	Boiled	3.45	11
Salmon, salted.....	Boiled	4.00	4
Beef.....	Fried	4.00	27
Veal.....	Boiled	4.00	25
Fowls, domestic.....	Boiled	4.00	...
Fowls, domestic.....	Roasted	4.00	...
Ducks, domestic.....	Roasted	4.00	...
Soup, beef, vegetables, and bread.....	Boiled	4.00	...

DR. BEAUMONT'S TABLE CONTINUED.

ARTICLES OF DIET.	How prepared.	Mean time of chymification.	Per cent of nutriment.....
		Hours.	
Heart, animal.....	Fried	4.00	...
Beef, old, hard, salted.....	Boiled	4.15	...
Pork, recently salted.....	Fried	4.15	...
Soup, marrow bones.....	Boiled	4.15	...
Cartilage.....	Boiled	4.15	...
Pork, recently salted.....	Boiled	4.20	...
Veal, fresh.....	Fried	4.20	...
Ducks, wild.....	Roasted	4.20	...
Suet, mutton.....	Boiled	4.20	...
Cabbage.....	Boiled	4.20	7
Pork, fat and lean.....	Roasted	5.15	21
Tendon.....	Boiled	5.20	...
Suet, beef, fresh.....	Boiled	5.20	...
Arrow root.....	.....	81	...
Butchers' meat.....	.....	24	...
Bread, stale.....	.....	75	...
Peas.....	.....	84	...
Lentils.....	.....	84	...
Wheat meal, mush.....	.....	85	...
Corn meal, mush.....	.....	90	...
Oat meal, mush.....	.....	91	...
Sugar candy.....	.....	89	...

Such a table may be studied with interest and profit. It will be seen that a dollar's worth of meat, at twelve and a half cents per pound, goes as far as fifty cents worth of butter at twenty-five cents per pound; and that three pounds of flour, at four cents per pound, furnish about the same amount of nutriment as nine pounds of beefsteak, costing twelve and a half cents per pound; and a loaf of good home-made bread, of the same size, contains as much nutriment as a leg of mutton. A pint of beans, weighing one pound, and costing four or five cents, contains as much nutriment as three pounds and a half roast beef, costing at least from forty to fifty cents; and an Irish potato is better than a pound of pork. Of all the articles that can be eaten, the cheapest are bread, butter, molasses, beans, and rice. A pound of corn meal goes as far as a pound of wheat flour, and ordinarily costs not more than half as much. If corn and wheat were ground, and the whole product, bran and all, were made into bread, fifteen per cent. would be saved pecuniarily, with a much greater per centage in healthfulness.

ARTICLES.	Flesh-producing.	Warmth-giving.
Human milk.....	10	40
Veal.....	10	1
Lard.....	10	2
Beef.....	10	17
Fat mutton.....	10	27
Fat pork.....	10	30
Cow's milk.....	10	30
Wheat flour.....	10	46
Oat meal.....	10	50
Rye flour.....	10	57
Barley.....	10	57
White potatoes.....	10	86
Black potatoes.....	10	115
Rice.....	10	123
Buckwheat.....	10	130

on the human milk imparting ten parts of the flesh-producing, and forty of the warmth-giving principle.

The following table shows the relative value of the several kinds of food in flesh-producing and oxygen-feeding, or warmth-giving ingredients:

Weight.	ARTICLES OF DIET.	SUPPLY TO BODY.	
		Flesh-forming principle.	Heat-forming principle.
lb.		P.	H.
100	Turnips.....	1.0	9.0
"	Red Beet root.....	1.5	8.5
"	Carrots.....	2.0	10.0
"	Potatoes.....	2.0	25.0
"	Bread, stale.....	10.7	61.3
"	Peas.....	20.0	51.5
"	Lentils.....	33.0	48.0
"	Barley meal.....	14.0	68.5
"	Wheat meal.....	21.0	62.0
"	Beans.....	31.0	51.5
"	Sago.....	3.4	81.0
"	Maize meal.....	11.0	77.0
"	Oat meal.....	12.0	71.0

Waste in Cooking.—Having sufficiently indicated the relative digestive properties of food, their flesh-producing and warmth-giving constituents, a few hints on the thoughtless waste and reckless extravagance practised in the kitchen, may not prove altogether unprofitable. In one sense, nothing is wasted; as all matter is returned to the inorganic world when it is unfit for longer use in organized forms; and all the materials of all structures are indestructible. But, in many families, there is a pecuniary waste, an unnecessary using up of fruits, vegetables, and manufactured articles, which would render comfortable many homes now suffering for just such things as are misused.

We know a family of two persons, in which is daily cooked food enough for twice that number. The surplus stands about the pantry, exposed to flies, dust, heat, frost—any casualties—or it is recooked, at twice the original cost; half of it to be eaten, and the remainder, with vegetables, moldy bread, and fruit, etc., to be consigned to the pigs. Here is a waste of food which requires a pretty long purse to maintain. Yet both husband and wife are constantly complaining of hard times; they lack money, and fear positive want. Well they may; for if anything is sure to bring want, it is waste. When the flour barrel is empty, the molasses keg drained, the sugar spent, and other things gone, neither husband nor wife seems to think that an unnecessary part of the whole has been devoured by pigs, nor that, if Mrs. EVE would have but one kind of food for each meal, and put on the table only half the usual quantity at once, they both

From LIEBIG we give the above table, based

would enjoy their meals far better, and have the surplus in good condition, to be relished at future meals. Nobody relishes bread that has been handled, broken, or rejected. But, newly-cut and wholesome looking, it is always enjoyed by the hungry. A meal consisting of but few kinds, is more enjoyed, as well as more healthful, than if composed of more kinds. Profusion is as unfavorable to enjoyment as it is to the health and the purse. Simplicity and economy insure domestic comfort and prosperity; but a thriftless wife brings sure ruin. Don't laugh, Mrs. EVE, saying, "I wonder how neighbor SNOWFLEET would like that!"—it means you, *you*.

We need in our country something like the Norwegian felted boxes, which are beginning to be used in England. When a leg of mutton is to be boiled, instead of its being kept on the fire for three or four hours (on the good old English method, which wastes fuel and hardens the meat), it is sufficient to keep it boiling for only ten minutes; and when it has been boiled for that time the fire is no longer needed, but the sauce-pan containing the meat is to be inclosed in the felted box till three or four hours later, when dinner-time arrives. The heat in the sauce-pan is prevented from escaping, as it can not pass through the non-conducting felt, and the process of cooking, therefore, goes on gently for hours, with no new application of heat. A leg of mutton has been kept quite hot three hours and a half after it was taken from the fire and inclosed in the box; and it is said that a leg of mutton was carried from Paris to London, in a Norwegian box, without getting cold on the journey.

Such boxes are coming into use for the luncheons of shooting parties and picnics, and of persons engaged in business. A gentleman takes with him to his office a small box, which looks like an ordinary dispatch-box; but it is a Norwegian felted box, which he opens at the time of his meal, and finds to contain hot food. This ingenious contrivance is admirably suited to the wants of the poor. Every poor woman makes a fire in the morning to boil the water for breakfast. That same fire may suffice to begin the cooking of the good man's dinner, and it may be kept hot for him, in one of these cheap boxes, under the hedges, while he attends to his work, till the hour for his meal arrives. Hot food is not only more palatable, but far more digestible and strengthening than cold food.

Captain WARREN'S "Cooker," an English

patent, is an admirable contrivance. The food in the patent sauce-pan, or "cooker," is cooked by the heat of steam, but without any contact with it. There is, therefore, no dilution whatever, nor any waste. When the meat is done, the meat and the gravy together are the exact weight of the raw joint. It is cooked in its own juices, so that its full flavor is retained, and as the temperature does not rise quite to the boiling point, the fiber is not rendered hard and indigestible by excessive heat.

"In our food," says Mrs. SARAH J. HALE, "the proportions of human milk are the best we can aim at; it has enough of flesh-producing ingredients to restore our daily waste, and enough of warmth-giving to feed the oxygen we breathe. To begin with the earliest making of dishes, we find that cows' milk has less of oxygen-feeding ingredients, in a given measure, than human milk; a child would, therefore, grow thin upon it, unless a little sugar were added; wheat flour has, on the other hand, so much an excess of oxygen-feeding power as would fatten a child unhealthily, and it should, therefore, have cows' milk added, to reduce the fattening power.

"The same sort of procedure applies in greater or less degree to all dishes. Veal and hare stand lowest in the list for their oxygen-feeding qualities, and on this account should be eaten with potatoes or rice, which stand highest, and with bacon and jelly, which furnish in their fat and sugar the carbon wanting in the flesh. With the above table before us, and keeping in mind the facts already detailed, it is clear that cookery should supply us with a mixed diet of animal and vegetable food, and should aim so to mix as to give us for every ounce of the flesh-making ingredients in our food, four ounces of oxygen-feeding ingredients. It is clear, also, that the most nourishing or strength-giving of all foods are fresh red meats; they are flesh ready-made, and contain, besides, the iron which gives its red color to the blood, being short of which the blood lacks vitality, and wanting which it dies.

"To preserve in dressing the full nourishment of meats, and their properties of digestiveness, forms a most important part of the art of cooking; for these ends the object to be kept in mind is, to retain as much as possible the juices of the meat, whether roast or boiled. This, in the case of boiling meat, is best done by placing it at once in briskly boiling water; the albumen on the surface, and to some depth, is immediately coagulated, and thus forms a

kind of covering which neither allows the water to get into the meat, nor the meat juice into the water. The water should then be kept just under boiling until the meat be thoroughly done, which it will be when every part has been heated to about 165° , the temperature at which the coloring matter of the blood coagulates or fixes; at 133° the albumen sets; but the blood does not, and therefore the meat is red and raw.

"The same rules apply to roasting; the meats should first be brought near enough a bright fire to brown the outside, and then should be allowed to roast slowly.

"Belonging to this question of waste and nourishment, it is to be noted that the almost everywhere-agreed-upon notion that soup, which sets strong jelly, must be the most nutritious, is altogether a mistake. The soup acts because it contains the gelatine of glue of the sinews, flesh, and bones; but on this imagined richness alone it has, by recent experiments, been proved that no animal can live. The jelly of bones boiled into soup, can furnish only jelly for our bones; the jelly of sinew, or calf's feet, can form only sinew; neither flesh nor its juices set into a jelly. It is only by long boiling we obtain a soup that sets; but in much less time we get all the nourishing properties that meat yields in soups, which are no doubt useful in cases of recovery from illness; but jelly is oftentimes unwholesome, for it loads the blood with not only useless, but disturbing products. Nor does jelly stand alone. Neither can we live on meat which has been cleared of fat, long boiled, and has had all the juice pressed out of it; a dog so fed, lost in forty-three days a fourth of his weight; in fifty days he bore all the appearance of starvation, and yet such meat has all the muscular fiber in it. In the same way, animals fed on pure casein, albumen, fibrin of vegetables, starch, sugar, or fat, died, with every appearance of death by hunger.

"Further experiments showed, that these worse than useless foods were without certain matters which are always to be found in the blood; namely, phosphoric acid, potash, soda, lime, magnesia, oxide of iron, and common salt (in certain of these, we may mention, by difficulty of digestion and poor nutriment qualities.) These salts of the blood, as they are termed in chemistry, are to be found in the several wheys and juices of meat, milk, pulse, and grain. Here, then, was the proof complete, that such food to support life must contain the several ingredients of the blood, and

that the stomach can not make, nor the body do without the least of them.

"It is an established truth in physiology, that man is omnivorous—that is, constituted to eat almost every kind of food, which separately nourishes other animals. His teeth are formed to masticate, and his stomach to digest flesh,* fish, and all farinaceous and vegetable substances—he can eat and digest these even in a raw state; but it is necessary to perfect them for his nourishment in the most healthy manner, that they be prepared by cooking—that is, softened by the action of fire and water.

"In strict accordance with this philosophy, which makes a portion of animal food necessary to develop and sustain the human constitution, in its most perfect state of physical, intellectual and moral strength and beauty, we know that now in every country, where a mixed diet is habitually used, as in the temperate climates, there the greatest improvement of the race is to be found, and the greatest energy of character. It is that portion of the human family who have the means of obtaining this food at least once a day, who now hold dominion over the earth. Forty thousand of the beef-fed British govern and control ninety millions of the rice-eating natives of India.

"In every nation on earth the rulers, the men of power, whether princes or priests, almost invariably use a portion of the animal food. The people are often compelled, either from poverty or policy, to abstain. Whenever the time shall arrive that every peasant in Europe is able to 'put his pullet in the pot of a Sunday,' a great improvement will have taken place in his character and condition; when he can have a portion of animal food, properly cooked, once each day, he will soon become a man.†

"In our own country, the beneficial effects of a generous diet in developing and sustaining

*Some determined advocates of the vegetable system maintain, that the teeth and stomach of the monkey correspond, in structure, very closely with those of man, yet it lives on fruits—therefore, if man followed nature, he would live on fruits and vegetables. But though the anatomical likeness between man and monkeys is striking, yet it is not complete; the difference may be, and doubtless is, precisely that which makes a difference of diet necessary to nourish and develop their dissimilar natures. Those who should live as the monkeys do would most closely resemble them.

†There is danger in extremes. "All medical men agree," says Miss CATHERINE E. BEECHER, "that, in America, far too large a portion of the diet consists of animal food. As a nation, the Americans are proverbial for the gross and luxurious diet with which they load their tables; and there can be no doubt that the general health of the nation would be increased by a change in our custom in this respect. To take meat but once a day, and this in small quantities, compared with the common practice, is a rule, the observance of which would probably greatly reduce the amount of fevers, eruptions, headaches, bilious attacks, and the many other ailments which are produced or aggravated by too gross a diet."

the energies of a whole nation, are clearly evident. The severe and unremitting labors of every kind, which were requisite to subdue and obtain dominion of a wilderness world, could not have been done by a half-starved suffering people. A larger quantity and better quality of food are necessary here than would have supplied men in the old countries, where less action of body and mind were permitted.

"Still, there is great danger of excess in all indulgences of the appetite; even when a present benefit may be obtained, this danger should never be forgotten. The tendency in our country has been to excess in animal food. The advocates of the vegetable-diet system had good cause for denouncing this excess, and the indiscriminate use of flesh. It was, and now is, frequently given to young children—infants before they have teeth—a sin against nature, which often costs the life of the poor little sufferer; it is eaten too freely by the sedentary and delicate; and to make it worse still, it is eaten, often in a half-cooked state, and swallowed without sufficient chewing. All these things are wrong, and ought to be reformed."

"It is generally admitted that the French excel in the economy of their cooking. By studying the appropriate flavors for every dish, they contrive to dress all the broken pieces of meats, and make a variety of dishes from vegetables at a small expense."

In the preparation of food, it should be the constant aim of the good housekeeper to unite the promotion of health, the study of economy, and the gratification of taste.

Hard and Soft Water in Cooking.—The effects of hard and soft water on vegetables vary materially. Peas and beans cooked in hard water containing lime or gypsum, will not boil tender, because these substances harden vegetable casein. In soft water they boil tender and lose a certain rank raw taste which they retain in hard water. Many vegetables (as onions) boil nearly tasteless in soft water because all the flavor is dissolved out. The addition of salt often checks this (as in the case of onions), causing the vegetables to retain the peculiar flavoring principles, besides much nutritious matter which might be lost in soft water. Thus it appears that salt hardens the water to a degree. For extracting the juices of meat to make broth or soup, soft water, unsalted or cold at first, is best, for it much more rapidly penetrates the tissues; but for boiling meat where the juices should be retained, hard water or soft water salted is preferable, and the meat

should be put in while it is boiling, so as to seal up the pores at once.

How to Beat Whites of Eggs.—On breaking eggs, take care that none of the yolk becomes mixed with the whites. A single particle will sometimes prevent their foaming well. Put the whites into a large flat dish and beat them with an egg-beater made of double wire, with a tin handle, or with a cork stuck crosswise upon the prongs of a fork. Strike a sharp, quick stroke through the whole length of the dish. Beat them in the cellar or in some other cool place, till they look like snow, and you can turn the dish over without their slipping off. Never suspend the process, nor let them stand even for one minute, as they will begin to turn to a liquid state, and can not be restored, and thus will make heavy cakes.

Substitute for Eggs.—The volatile element in fresh snow renders two table-spoonsful of it equal to one egg in any compound that requires lightness rather than richness—thus, to a small loaf-cake, ten table-spoonsful of snow.

For cooking purposes, one table-spoonful of corn starch is said to be equal to one egg.

How to Save Shortening.—Mix one-fourth corn meal with wheat flour, and your pastry will be lighter and more wholesome, besides considerably less shortening is required.

Saleratus.—As an article of cookery, it is unquestionably bad, very bad. Canker in the mouth, ulcerated bowels, weak stomachs, and bad blood are its ordinary effects. The best raising materials for those who will use acids and alkalies of any kind are supercarbonate of soda and sour milk.

Good fresh snow, in its season, is probably the most natural yeast ever used, supplying atmosphere wherewith to puff up the dough, whereas other methods only supply carbonic gas. Bread thus made is delicious and wholesome.

Hasty Cream.—Take a gallon of milk warm from the cow, strain and set it over the fire; when it begins to rise, take it off and set it by; skim off all the cream and put it on a plate, then set the stew-pan over the fire again; as soon as it is ready to boil, take it off and skim again, repeating the skimming until no more cream rises. The milk must not boil. This cream may be provided when needed for prompt use.

To Keep Cream Sweet.—Cream may be kept sweet twenty-four hours, by simply scalding it, without sugar; and by adding as much powdered lump sugar as will make it quite

sweet, it may be kept for two days in a cool place.

Household Measures.—As all families are not provided with scales and weights referring to ingredients in general use by every housewife, the following may be useful :

Wheat flour, one pound is one quart.

Indian meal, one pound two ounces is one quart.

Butter, when soft, one pound one ounce is one quart.

Loaf sugar, broken, one pound is one quart.

White sugar, powdered, one pound one ounce is one quart.

Best brown sugar, one pound two ounces is one quart.

Eggs, average size, ten eggs are one pound.

Sixteen large table-spoonsful are half a pint, eight are one gill, four half a gill, etc.

Twenty-five drops are equal to a tea-spoonful. A common-sized tumbler, half a pint; a common-sized wine-glass, half a gill.

Errors in Cooking.—The late Dr. DANIEL DRAKE, of Cincinnati, in his Treatise on the Principal Diseases of the Interior Valley of North America, gave the following enumeration of the vicious modes of cooking which prevail in the valley :

1. With the mass of our population, bread of every kind is apt to be baked too soon after the flour or meal has been wetted—that is, before there has been sufficient maceration. But what is still worse, it is scarcely ever baked enough.

2. Biscuits, as they are called, are baked in close ovens, by which process the fat they contain is rendered empyreumatic and indigestible.

3. When the dough for leavened bread, by excess of panary fermentation, has been charged with acetic acid, that product is not in general neutralized by the carbonate of potash or soda, but the bread is eaten sour.

4. Pastry, instead of being flaky and tender, is often tough and hard, sometimes almost horny.

5. Meats are often baked and fried, instead of being roasted or broiled, whereby they become impregnated with empyreumatic oil, and not unfrequently charred on the outside. In general, they are overcooked.

6. Fresh meats, and especially poultry, are commonly cooked too soon after death.

7. Soup is often prepared from parts deficient in gelatine, and abounding in fat, which swims upon the surface, and is much more indigestible than the meat would have been, if eaten in the solid form.

8. Eggs are generally boiled so hard as to render them tough, and many are often fried in fat, to a still greater degree of induration. Fried bacon and eggs, eaten with hot unleavened biscuit, containing lard, and then buttered, is a favorite breakfast in many parts of the valley.

9. Vegetables, abounding in fecula, such as potatoes, rice, and pulse, are often boiled so little, that all the starch grains are not burst open; while those containing albumen, as cabbage, are boiled until that element is firmly coagulated and deposited in the structure of the leaf.

Culinary Couplets.—We close our general remarks on cookery by the following apt and suggestive culinary couplets by an anonymous writer :

Always have lobster-sauce with salmon,
And put mint-sauce your roasted lamb on.
Veal cutlets dip in egg and bread-crumbs—
Fry till you see a brownish red come.
Grate Gruyere cheese on macaroni;
Make the top crisp, but not too bony.

In venison gravy, currant-jelly
Mix with old Port—See Francatelli.

In dressing salad, mind this law—
With too hard yolks use one that's raw.
Roast veal with rich stock gravy serve;
And pickled-mushrooms, too, observe.

Roast pork sans apple-sauce, past doubt,
Is "Hamlet" with the Prince left out.

Your mutton-chops with paper cover,
And make them amber brown all over.

Broil lightly your beefsteak—to fry it
Argues contempt of Christian diet.

Kidneys a finer flavor gain
By stewing them in good champagne.

Buy stall-fed pigeons. When you've got them,
The way to cook them is to pot them.

Wood-grouse are dry when gumps have marred 'em—
Before you roast 'em always lard 'em.

To roast Spring chickens is to spoil 'em—
Just split 'em down the back and broil 'em.

It gives true epicures the vapors
To see boiled mutton, minus capers,

Boiled turkey, gourmands know, of course,
Is exquisite, with celery-sauce.

The cook deserves a hearty cuffing,
Who serves roast fowls with tasteless stuffing.

Smelts require egg and biscuit powder.
Don't put fat pork in your clam chowder.

Egg-sauce—few make it right, alas!
Is good with blue-fish or with bass.

Nice oyster-sauce gives zest to cod—
A fish, when fresh, to feast a god.

Shad, stuffed and baked, is most delicious—
'Twould have electrified Apicius,

Roasted in paste, a haunch of mutton,
Might make ascetics play the glutton.

But one might rhyme for weeks this way,
And still have lots of things to say.

And so I'll close—for, reader mine,
This is about the hour I dine.

New Process of Meat-Preserving.

For scores of years have ingenious men sought for some method of preserving meat, which should supersede salting, jerking, freezing, canning, cooking, and other processes, all of which tend to deprive the flesh of its natural flavor. The research of PASTEUR, LIEBIG, POUCHER, SIEBOLD, MORGAN, and others seems likely to be amply rewarded. A process has at last been discovered and put in practical operation by Professor JOHN GAMGEE, which promises to confer the greatest benefit upon mankind. It is as simple as it is effective, and will be likely to come into general use in every country of the temperate zone.

GAMGEE's process is now owned by the GAMGEE Meat-Preserving Company, of Middlefield, Connecticut, and it consists in preventing putrefaction by the use of carbonic oxide and sulphurous acid gas. Agents are using the process in Ohio, and negotiations are pending for the other Western States.

After treatment by this method the meat of any animal may be kept for months, and, when eaten, it proves as juicy, sweet, and succulent, as when entirely fresh. In fact, the process instantly suspends the work of decomposition, and preserves the flesh with all its original flavor and of a deep rich color.

"In January, 1866," says Professor GAMGEE, "I made the first considerable series of experiments on the feeding of animals with peculiar products, so as to render the flesh much less perishable, and some remarkable results were obtained with oak bark. We learned in the Summer of 1867," he continues, referring to his brother and himself, "that meats preserved in cans, by the combined action of carbonic oxide and sulphurous acid, would cross the Atlantic if packed in simple brown paper, and from that day to this, my operations have been directed to the preservation of the entire carcasses of animals, which require, according to their size and thickness, from five to twenty days for their complete preservation. Such meat keeps many months, and may be preserved anywhere, at any season of the year, and when other modes of preservation, such as salting, are impracticable. There are conditions to be observed, according to the surrounding circumstances; but anywhere and everywhere animals can be cured, by the dozen, fifties or hundreds; and the cost, in any part of the American continent, can not exceed, including all possible expenses, a dollar for a bullock, and ten or twenty cents for a sheep.

"We have packed meats in Chicago and New York which have been eaten in the hottest parts of this continent; and we are resolved on following up a success which is quite unprecedented in the art of fresh-meat preservation, and demonstrates that the problem which the Old World has studied for years, and which the New has so much interest in unraveling, is finally, definitely, and irrevocably solved."

Colonel MARSHALL P. WILDER thus testifies in the Massachusetts Agricultural Report, for 1869: "The Massachusetts Agricultural Club was honored, in the early part of last April, with the presence of Professor GAMGEE as a guest, when he presented us with a fine leg of mutton, cooked at the Parker House, which he informed us had been preserved in London in October, and came out in a dry box, without any other preparation or care, to New York. We had on the table, the same day, a very fine leg of mutton of our own growth; and, to our astonishment, that of Professor GAMGEE's was more juicy, was ripier than the other, and was, in fact, a first-rate leg of mutton, in perfect preservation. It had a deep, florid, beautiful color, surpassing that of the fresh leg. It was more juicy than ours; and, in a word, we should have taken it to be a ripe, mature leg of mutton, just fit to eat."

Prof. AGASSIZ said at a subsequent meeting: "May I add another testimony? I was not present at that meeting, but a friend of mine, the French Consul in Boston, who was there, told me of that mutton. He has been used to dining at the best restaurants of the Palais Royal for years; and he told me that he never ate better mutton than he ate that day, from that leg, prepared in London in October, and eaten in Boston in April. There is nothing more practical than the most advanced science."

It seems likely that this method will achieve the great success that is predicated for it; if so, it will revolutionize the provision and market system of the world. Salt-junk, that arch-enemy of human life, will be banished from barracks and shipboard. The store-room of the whaler and merchantman will be fragrant with savory broadsides of beef. The traveler, the emigrant, the private soldier on an inaccessible post, will taste delicious chops and steaks, fresh and dripping, brought a year before from the hill-sides of home. And, better yet, through the long Winters, the farmers of every land, instead of feeding on abominable salt pork, and thus providing for unborn generations a heritage of cancers and scrofula, will

find upon their dinner-tables the fresh roasts and rounds of the beeves they killed in the Fall—no tenderness lost in the meantime, and no extraneous flavors or odors acquired.

To the farmers of the West, generally distant from the butcher's stall, are the advances in the art of fresh-meat preservation of the highest moment. If they reap the advantages foreshadowed in the discovery, not only will their own tables have an unfailing supply, but their prairie farms will more economically and more humanely supply the tables of the East. No more living flocks and herds on a thousand miles of railroad, reeling with agony, feverish and fainting, starving and stifling in overcrowded cars!

It is probable that instructions may be made so clear and minute that they can cure their own meat, for the process appears as simple as it is inexpensive; but, if this shall not at once seem practicable, it is not too much to hope that Meat-Preserving Factories may be established through our States that will do the work for a slight commission, on the principle of the cheese-factory system. That day will be the beginning of meat-luxuries for the tables of the poor, and the end of the cruel, savage system of live-stock transportation.

Bread.—The Bible tells us that "bread strengtheneth man's heart," and that "bread is the staff of life." From the third chapter of Genesis, where the word first occurs, it is used in the Scriptures more than a hundred times, mostly as a common term signifying food in general. It is not known when raised bread first came into use; but the fact that MOSES, at the institution of the Passover supper, commanded the Jews to abstain from leavened bread, and eat only unleavened, proves that they were accustomed to fermented or raised bread. History informs us that the Greeks were taught the art of bread-making long before the Romans, who took from Macedonia Grecian bakers into Italy; and from Rome the art gradually found its way over considerable portions of Europe.

How to Select Flour.—First, look at the color; if it is white, with a slight yellowish or straw-colored tint, buy it. If it is very white, with a bluish cast, or with white specks in it, refuse it. Second, examine its adhesiveness; wet and knead a little of it between your fingers; if it works soft and sticky, it is poor. Third, throw a little lump of dry flour against a dry, smooth, perpendicular surface; if it falls like powder it

is bad. Fourth, squeeze some of the flour between your hands; if it retains the shape given by the pressure, that, too, is a good sign. Not so with that which has been adulterated; its adhesive property is weak, and it falls to pieces immediately; nor is its whiteness any evidence of its goodness, for the different materials used in its adulteration have a tendency to whiten it. Fifth, place a thimbleful of it in the palm of the hand, and rub it gently with the finger of the other hand; if it smoothes down under the finger, feeling silky and slippery, it is of inferior quality, though it may be of fancy brand, high-priced, and white as the virgin snow-drift. It has been either too low ground, or made from damaged wheat, or, perhaps, having an unusual percentage of gluten, murdered with dull burrs, and will never make good, light, wholesome bread; but if the flour rubs rough in the palm, feeling like fine sand, and has an orange tint, purchase confidentially. Flour that will stand all these tests, it is safe to buy. These modes are given by old flour dealers, and they pertain to a matter that concerns everybody—the staff of life.

To Improve Poor Flour.—When families have the misfortune to get poor flour, which, when used for bread-making with yeast, will sour before it is ready for baking, the difficulty may sometimes be remedied by mixing a little finely-pulverized saleratus with the dry flour, and then add the yeast, and it will make sweet bread. Saleratus, however, is unwholesome—the less used the better.

Graham Flour and Bran Bread.—If the whole product of wheat and corn, bran and all, were made into bread, fifteen per cent. more of nutriment would be added. Unfortunately the bran, the coarsest part, is generally thrown away; the very part which gives soundness to the teeth, and strength to the bones, and vigor to the brain. Five hundred pounds of fine flour give to the body thirty pounds of bony element; while the same quantity of bran gives one hundred and twenty-five pounds. This bone is lime—the phosphate of lime; the indispensable element of health to the whole human body; from the want of the natural supply of which multitudes of persons go into a general decline.

The reason why brown bread is considered more healthful and more nutritious than when made of superfine flour, is because the outer portion of the kernel of wheat contains the greatest proportion of oil and gluten; and this is the reason why bran possesses such fattening

qualities. The best fine flour contains about seventy pounds of starch to each hundred. The residue of one hundred pounds consists of ten or twelve pounds of gluten, six to eight pounds of sugar and gum, and ten to fourteen pounds of water, and a little oil.

LIEBIG says: "The separation of the bran from the flour by bolting, is a matter of luxury, and injurious rather than beneficial as regards the nutritive power of the bread."

It is only in more modern times that sifted flour has been known and used, and the custom has been followed by the poor, to imitate the luxury of the wealthy, at the expense of their own health. Certain it is, that where whole meal is used as bread, the population have better digestive organs than where it is not.

It is gratifying to observe that all over our country, at the hotels, boarding-houses, restaurants, on steamboats, and at the tables of the rich and poor, Graham, or brown bread is found, and is constantly growing in demand and esteem.

When Graham flour can not be had conveniently, an excellent substitute may be produced by mixing two-thirds common flour and one-third bran, unsifted.

Corn Meal.—Indian meal may be much improved for cooking by being kiln-dried. This is easily done—spread it on a dripping-pan, and heat it in the oven. The peculiar properties of Indian corn render it desirable for frequent use. Corn meal is conceded by all to be better for digestion and general health than fine flour, except for some invalids. Being capable of various forms of preparation, it has become a favorite with many good housewives, and should always be found in the store-room.

Indian corn is indigenous to this continent. Old-country people do not have it, and on first being made acquainted with it at our tables, stare in astonishment at the rapid disappearance of delicious steaming ears of sweet-corn, huge slices of hot johnny-cake, and the tender delicate brown muffins of the tea-table. But they soon learn to like what is good, as well as ourselves.

In the Southern dwelling of aristocracy, as in the humble negro hut, corn meal has always taken a conspicuous place at the family meal, and there it is, one will find it prepared in the greatest variety and perfection. A lady who was for three years a resident in a wealthy and genteel family in the far South, says she never

sat down at table without finding some dainty form of corn bread. Wheat bread also graced the board, but was not as much desired.

Methods of Making.—Good bread is indeed the staff of life; it contains one-third more nourishment than butcher's meat, though it is less stimulating, and less easily digested. The amount of injury done to the tender stomachs of young children, invalids and sedentary persons by eating bad bread day after day, from one year's end to another, must be enormous. A cook who can not make good bread of every description, ought not to be allowed house-room for an hour; and that mother is criminally negligent, whatever may be her position, who does not teach her daughter to know what good bread is, and how to make it. Alum is used to give whiteness, softness, and capacity for retaining moisture. Lime could be employed with equal effect, having the advantage of correcting any sourness in the bread or stomach; besides affording an important ingredient for making the bones strong. Every housekeeper ought to know how to make at least two or three kinds of good bread.

Bad cooking produces the most unhealthful kinds of food, such especially as sour and heavy bread, cakes, pie-crust, and other dishes compounded of flour, fat, rancid butter, and high-seasoning generally.

The starch, gluten, and saccharine matter, all properties of flour, act upon each other, in raising the dough. Carbonic acid gas, formed by the action of the yeast on these properties of the flour, is the air which puffs up or swells out the dough, and forms what is called raised bread. When the dough stands too long, the fermentation destroys the sugar, acts on the starch, and produces acid. As long as the fermentation is confined to acting upon the saccharine matter, the other properties of the flour are uninjured; further fermentation must be arrested by the heat that bakes it into bread. If the fermentation acts upon the mucilage and starch, the acid must be neutralized by saleratus or soda. By this process we may have bread free from acidity, but in a short time the bread is apt to become dry and tasteless. If the dough becomes acid, the best and most successful way of adding the alkali is at the time of molding the dough into loaves, just sufficient to correct the acidity. Much care and judgment are required in applying this, or the bread will be clouded with yellowish spots, or assume a sickly appearance all over. The surest way

is to dip the fingers into the solution and thrust them in every part of the dough as it is worked over.

To make good bread, a great deal of pains should be taken, after selecting good flour and sweet yeast, in working up and kneading the dough. It is not enough to stir the ingredients together, so as to get through the business as soon as possible; but it must be thoroughly worked together with the hands, that the yeast may penetrate every particle of flour. The second working, previous to putting into pans, should be attended with still greater care; it should be kneaded until perfectly smooth and of a flaky appearance. No more flour than is necessary to keep it from adhering to the board and hands should be used, else the bread will be too hard and dry. Soft water is preferable to make dough. Some persons prefer milk, or milk and water, though, with some, the animal taste produced by milk is objectionable. Poor bread often comes of poor yeast, which, by long keeping, dampness, and other causes, lose some of its properties, and fails to make a light, white, and sweet baking.

Good Yeast.—1. Take a large handful of hops, tied up in a bag made of musketo netting, and boil them in two quarts of water till the strength is fully extracted. Grate into a tin pan about eight common-sized potatoes, and add a tea-cup of sugar, a spoonful each of table-salt and ginger; and then pour the hop water on the whole, and place the pan on the stove to boil about ten minutes; then add a pint of good hop yeast; set it away till worked or nearly so, then put it into a jug, and leave the cork out, the jug to be set in a pan to catch what may work over; and, when done working, cork it up and keep it in a cool place. A tea-cupful is sufficient for three good-sized loaves of bread. Yeast made in this way will keep from four to six weeks.

2. Yeast for hot seasons, or warm climates, may be made by boiling two ounces of best hops in four quarts of water for half an hour; strain it, and let the liquor cool down to a new-milk warmth. Then put in a small handful of salt and half a pound of brown sugar; beat up one pound of the best flour with some of the liquor, and mix all well together. The third day add three pounds of potatoes, pared, boiled, and finely mashed, and let it stand until the next day; then strain, when it is ready for use. Stir frequently, and keep it near the fire while making, and then put it in a cool place, when it

will keep in good condition two or three months. Stir well before using.

3. Peach leaves, from their earliest appearance in the Spring till spoiled by the Autumn frosts, boiled up, make an excellent yeast decoction, to be used each time as wanted; or the decoction may be thickened with Indian meal and dried for Winter use. Peach yeast produces quick and beautiful rising, and those who once use it prefer it to hops.

Yeast or Emptying Cakes.—1. Take half pound of hops, twelve peeled potatoes, boiled in two quarts of water with the hops; strain the water upon one quart of flour, mash the potatoes and add to the flour, and, when cold, add one tea-spoonful of molasses, two table-spoonsful of salt, one of ginger, and one tea-cup of yeast (or five yeast cakes, dissolved in water); when it rises, stir in corn meal to make it stiff enough to roll out. Cut into cakes half an inch thick.

2. The Hungarians thus prepare yeast that keeps a whole year: Boil a quantity of wheaten bran and hops in water; the decoction is not long in fermenting, and, when this has taken place, throw in a sufficient portion of bran to form the whole into a thick paste, which work into balls and dry by a slow heat. When wanted for use they are broken and boiling water is poured upon them. Having stood a proper time, the fluid is decanted and is in a fit state for leavening bread.

Yeast Powders.—Take two pounds of pulverized cream of tartar, sift it through Swiss muslin; one pound of carbonate of soda, pulverized and sifted in the same manner, to be well mixed with a pound of twice-sifted buckwheat flour. Use two heaping tea-spoonsful to a quart of flour.

Directions for Baking.—The housewife who would bake her bread or biscuit without a dry, hard crust, can do so very readily. Just before placing her bread in the oven, she has only to rub its surface with butter or lard. This will close the pores, preventing the escape of the gas which is produced by the yeast, and the escape of the steam which is produced by the moisture of the heated loaf. Bread thus baked, will be almost crustless. Indeed, so long as the moisture is confined, it will be difficult to burn the loaf to any great depth. The large vacuities in the bread will be less numerous, though, as a whole, it will be more porous, and therefore lighter. Yeast bread, when two or three days old, becomes crumbly, and in appearance, though not necessarily in fact, dryer than when

it was at first baked. This apparent dryness arises, not from a loss of moisture, but from a chemical change in the arrangement of the bread molecules. Put the bread into an oven, heated to a point slightly below boiling water, so that the moisture of the bread may not be turned into steam and escape, and its original softness will at once be restored.

Wheat Bread.—1. For four large or five good sized loaves, proceed in this way: Scald one tea-cup of Indian meal, by pouring over it boiling water, and stirring it to keep it from being lumpy; when it is cool, grate in four boiled potatoes, add three pints of tepid water, and stir in sufficient flour to make a soft batter, add a tea-cupful of home-made yeast, and set it to rise. This is the sponge. When it is light, which will be in about six hours, or over night, put seven pounds of flour in a bread bowl (sifting it first), make a hole in the center, put in a table-spoonful of salt, pour in the sponge, add one quart of tepid water, and work it with the hands into the rest of the flour till you have a soft dough, then knead it thoroughly, till in turning it over it does not adhere to the bread bowl. Let it rise again, and when light, it will have increased nearly three times the size when it was made. Now mold it lightly into loaves, put them in buttered pans, and set the pans in a warm place. As soon as the loaves rise a little, so as to begin to crack, put them in the oven. If they rise too much, the bread will be tasteless; if not enough it will not be sufficiently light. Try whether bread is done by inserting a broom splint or wooden skewer; if withdrawn without any dough adhering, the bread is done. The heat of the oven can be judged by practice.

2. A writer in *Hearth and Home* says, bread should never be put to rising over night, as changes of atmosphere affect it, and must be carefully noted. Early in the morning, make up your bread with lukewarm water or milk, and good home-made or baker's yeast—never brewer's. Knead it well, and set it in rather a warm place to rise. No sponging beforehand—it is wholly unnecessary, and only another opportunity given to become sour. In four hours, if kept sufficiently warm, it will be light enough to put in pans; let it rise in them twenty minutes—no longer, for here the trouble generally lies—for it is allowed to rise, and rise, till it cracks and runs over. Put it into the oven as soon as it begins to rise in the pans. If the oven is so hot that the loaves become browned or crusted over the first half hour, they can not rise as they should. After the

first half hour, increase the heat enough to give them a beautiful light brown. Good-sized loaves should be an hour in baking.

3. JAMES ROCHE, long a celebrated bread-maker, of Baltimore, says: Take an earthen vessel larger at the top than the bottom, and in it put one pint of milk-warm water, one and a half pounds of flour, and half a pint of malt yeast; mix them well together, and set it away (in Winter it should be in a warm place), until it rises and falls again, which will be in from three to five hours (it may be set at night if wanted in the morning); then put two large spoonfuls of salt into two quarts of water, and mix it well with the above rising; then put in about nine pounds of flour, and work your dough well, and set it by until it becomes light. Then make it out in loaves. The above will make four loaves.

As some flour is dry and other runny, the above quantity, however, will be a guide. The person making bread will observe that runny and new flour will require one-fourth more salt than old and dry flour. The water, also, should be tempered according to the weather, in Spring and Fall it should only be milk-warm; in hot weather cold, and in Winter warm.

4. Prof. E. N. HOSFORD, in a recent lecture before the American Institute's Farmers' Club, on the "Philosophy of the Oven," gave the following recipe for making good bread: Take fresh ground wheat flour; boil thoroughly, with their skins on, in a quart of water, potatoes enough to make a quart of mashed potatoes; peel the potatoes and mash and add a quart of flour, then let cool to eighty degrees. Add then one pint of brewer's yeast and set aside to raise. Then add half a pint of water or milk to seven pounds, salt and knead thoroughly. This will make four small loaves; put them in tin pans larger than the loaves, cover them with tin or stiff paper, in an oven heated to 212°. When nearly done, remove the cover to allow the crust to brown.

Sweet-Potato Bread.—Boil potatoes thoroughly done, peel them, and mash them up fine; add a sufficient quantity to your yeast and flour, make into dough and bake. This makes a most delicious bread, much superior to that made of the common potato. The toast made from this bread is much softer, sweeter, and superior to that from bread made in the ordinary manner. Sweet-potato biscuit are excellent, but not so healthy as bread.

Buttermilk Bread.—The sponge—Take three pints of buttermilk (it does not matter how sour

it is), and put it in a sauce-pan to boil; take one pint of flour and put it into a bowl or jar, with half a tea-spoonful of salt. When the buttermilk is boiling, pour it over the flour, stirring quickly that the whole may be scalded. Let it stand until it is but milk-warm, and add a half pint of yeast. This should be done over night. In the morning take flour sufficient for three large loaves, and upon this pour a pint of water nearly boiling hot, mix well; then add the sponge; knead thoroughly and mold into loaves, putting them into buttered pans to rise. In two hours they will be ready to bake.

Milk-Rising Bread.—Take two cups of boiling water, two cups of new milk, and one tea-spoonful of saleratus—make a batter of it, and put it in a tin pail to rise. Keep the water a little more than lukewarm. The cause of its turning acid is not being kept warm enough, and letting it stand too long. This will be found upon trial to be a capital article.

Dr. Hall's Bread.—Dr. HALL, of the *Journal of Health*, recommends the following as the very best mode of making good, cheap, and healthful bread: To two quarts of Indian-corn meal, add one pint of bread sponge, water sufficient to wet the whole; add one half pint of flour, and a tea-spoonful of salt. Let it rise, then knead well—unsparingly—and for the second time. Place the dough in the oven, and let it bake an hour and a half.

Pumpkin Loaf.—Take a good flavored pumpkin, or Hubbard squash, cut it up fine, and stew it down with a little water until it becomes very rich and consistent; mix rather less white corn meal, with sufficient sweet milk to make a consistent dough; make it up in dodgers three-fourths inch thick, and bake in a hot oven. Eaten with good butter and milk, nothing is more palatable.

To Make Old Bread New.—If the loaves are a week old, steep for half a minute in cold water. Then put the loaf in the tin it was first baked in, taking care to take it out of the oven when nicely heated through.

Or, if dry or sour bread is cut into small pieces, and put in a pan and set in a very moderately warm oven until of a light brown, and hard and dry in the center, it can be kept for weeks. Whenever you wish to use a portion of them for puddings or griddle-cakes, soak them soft in cold water or milk. If the bread is sour, use sufficient saleratus or soda to destroy the acidity of it in making the pudding or cakes. With proper care, there need be no waste of even poor bread.

Unfermented Bread.—1. No kneading is necessary nor time required for the dough to rise; and it has, moreover, the merit of keeping much longer than raised bread without becoming sour or moldy. Common bread, in weak stomachs, is very liable to turn sour, producing heartburn and flatulency, and to aggravate cases of dyspepsia; but, when manufactured by this improved process, it is altogether free from these baneful effects. Its daily use in health prevents these symptoms, and in many cases it corrects that morbid condition of the stomach and intestines on which these symptoms depend. It is useful in assisting to restore the biliary, and especially the renal secretions to a healthy condition, as well as in the treatment of various cutaneous eruptions originating in disorder of the digestive functions.

In the *Pharmaceutical Journal*, several excellent recipes are given for the manufacture of unfermented bread, from which we select the two following, which we deem the most simple and best. The first is by Dr. SMITH, of Leeds:

Five pounds of flour, one-half ounce (apothecary's weight) of sesquicarbonate of soda, one-half dram sesquicarbonate of ammonia, four drams or tea-spoonful of common salt. Mix these intimately together, and then add the following solution: Fifty ounces or two and a half pints of clean cold water, five drams of hydrochloric acid.

Then follows the recipe of Mr. H. DEANE: Take four pounds of flour, one-half ounce (avoirdupoise weight) of bicarbonate of soda, four and a half fluid drams of hydrochloric acid, one-quarter ounce of common salt, forty fluid ounces or two pints of pure cold water. Mix the soda perfectly with the flour, and the acid with the water, then the whole intimately and speedily together, using a flat piece of wood for the purpose. It may then be made into two loaves, and put into a quick oven immediately. It will only require about one and a half hours to bake.

In this kind of bread kneading will prove injurious, by making the mass too heavy, as the dough must not be too stiff.

2. Dr. R. T. TRALL, in his "*Gospel of Health*," gives the following still more simple mode of making unfermented bread, without the soda, ammonia, and acid, which are objectionable to dyspeptic stomachs: "Mix unbolted meal of any grain preferred, or a mixture of two or more kinds, in any proportions which may be preferred, with pure water, either cold or hot. If cold water is used, the meal and water should

be mixed to the consistency of thick batter; then beaten or stirred a little with a spoon or ladle to incorporate more atmospheric air, after which more meal is to be added, until the mass becomes as stiff a dough as can well be kneaded. Knead the dough for a few minutes, (and the more the dough is kneaded, the more brittle and tender the bread will be), cut into pieces or cakes half an inch or more in thickness, and about two inches in diameter, and bake in a quick oven as hot as possible, without burning the crust, which must be carefully guarded against. It is better to moderate the heat of the oven a little after three or five minutes. If hot water is used, it should be *boiling* hot, and the meal and water stirred together very quickly with a strong spoon—the dough not quite as stiff as for ordinary loaf bread made of fine flour. It is then to be cut into pieces or cakes, and baked as above. Either form of bread may be made into larger or smaller cakes, or into loaves of any convenient size to bake, and baked in a gas, wood, coal, or kerosene stove, or in an oven; and the crust must be rendered as soft and tender as may be desired, by enveloping the cakes or loaves a short time in wet cloths, immediately on being taken from the oven. The small cakes, when made with hot water, will soon become tender, by being kept in a covered earthen crock, as even the toothless may desire; or they may be rendered as hard and solid as the soundest teeth can require, by leaving them uncovered in a dry place.”

Meal of corn or wheat stirred up according to the foregoing directions, with the addition of three or four eggs, and then cooked with *steam*, instead of baking, and eaten with some kind of sauce, is simple, wholesome, and very pleasing to the palate, and good for a change.”

3. *Gems*.—Stir together Graham flour and cold water to about the consistency of ordinary cup-cake batter. Bake in a hot oven in small tin patty-pans, two inches square and three-fourths of an inch deep.

This makes delicious bread. It may be improved by beating the batter in the same manner as eggs are beaten, for five, ten, or fifteen minutes; the longer the better. No definite rule as to the proportions of flour and water can be given, owing to the difference in the absorbing power of various brands of flour.

Many persons have failed of success in making this bread from neglecting one very essential requisite—the size of the pans in which it is baked. If they are larger than the dimen-

sions given, the bread will be heavy. If smaller, it will be dry and hard. But made this size, and filled evenly full, if the batter is of the right consistency, and the oven very hot, they will rise one-half, and be almost as light and porous as sponge-cake.

4. *Diamonds*.—Pour *boiling* water on Graham flour—stirring rapidly till all the flour is wet. Too much stirring makes it tough. It should be about as thick as can be stirred easily with a strong iron spoon. Place the dough with plenty of flour upon the molding board, and knead it for two or three minutes. Roll out one-half an inch thick, and cut in small cakes or rolls. If a large quantity is required, roll about three-fourths of an inch thick, and cut with a knife in diamond shape. Bake in a very hot oven forty-five minutes.

Graham or Coarse Wheat Bread.—Two-thirds unbolted wheat flour, one-third corn meal, a little molasses; mix with warm water. One large cup of potato yeast will make two good-sized loaves. Mix and let it rise over night, and your bread will be ready to mold and put in your pans before breakfast. Do not let it rise too long the second time—much bread is thus spoiled.

Brown Bread.—Two cups of Indian meal, one of Graham flour, two cups of sour milk, one of sweet, one small tea-spoonful of soda, one of salt, and two table-spoonfuls of molasses or sugar. Place it in a tin pail or steamer well closed, which set in a kettle of boiling water. Steam three hours; some steam five hours. This may be varied; some prefer it made of Indian meal, without flour. Where milk is not at hand, sour batter will answer the purpose.

Boston Brown Bread.—One heaping quart of rye flour, one quart of Indian meal, one quart of Graham flour, scanty quart of milk, same quantity of warm water, coffee-cup of molasses, one penny's worth of baker's yeast, or one coffee-cup home-made yeast, tea-spoon of saleratus, dessert-spoon of salt. Grease an iron kettle, put in the mixture, and place immediately in a slow oven. Bake six or seven hours.

Buckeye Brown Bread.—Take a pint of new milk, warm from the cow, add a tea-spoonful of salt, and stir in fine Indian meal until it becomes a thick batter; add a gill of fresh yeast, and put in a warm place to rise; when it is very light, stir into the batter three beaten eggs, adding wheat flour until it has become of the consistency of dough; knead it thoroughly, and set it by the fire until it begins to rise; then make it up into small loaves or

cakes, cover them with a thick napkin, and let them stand until they rise again; then bake in a quick oven.

Buttermilk Brown Bread.—Buttermilk, the day it is churned, four tea-cups; soda, one tea-spoonful; stir together, and pour in sufficient brown flour to make a dough as stiff as can be stirred and laid flat in a pan with a spoon; one large table-spoonful of sugar in flour before the milk. Bake in deep pan, well buttered, in cool oven, two hours; best when cold. Corn bread made in this way is very nice.

Corn and Bran Bread.—Two quarts of corn meal, two quarts shorts or bran, one tea-cup molasses, one tea-spoon of salt. Stew a squash or pumpkin in water enough to wet this mass; mash fine and pour it boiling hot over the meal. Stir it well, and when cool enough add a pint of yeast, and two quarts wheat flour. This will make four loaves; when light, bake three hours.

Wheaten Grits Biscuit or Thin Bread.—Mix with yeast and water into a thin dough; let it stand a few hours till light; spread about an inch thick or less into pans, and bake well; to be eaten while fresh.

Rye and Oat-Meal Bread.—Rye is seldom made into bread except as mixed with wheat flour or corn meal. Unbolted rye or oat meal, or both together, stirred into cold water, and made into rather soft dough, kneaded for five or ten minutes, and baked in a hot oven from thirty to forty-five minutes, makes excellent and wholesome bread for those who like the peculiar flavor of those grains.

Rye and Indian Bread.—For a good, thick loaf, take one pint rye flour to three pints of corn meal, one-half tea-cup molasses, or brown sugar, scald with boiling water—be sure to stir in water enough to thoroughly scald it—cover it up and let it stand till cool, then reduce with cold, sweet milk until thin enough to pour into your pan; bake all day, let it stand in the oven all night, and in the morning you will have the best loaf of bread you ever tasted. If your crust is too hard to eat, remove it, soak in water, and add to your next loaf. It will be richer than the first.

Corn Bread.—1. For plain corn bread, six pints of meal, one table-spoonful of salt, four pints water; thoroughly mixed with the hand, and baked in oblong rolls about two inches thick. Use as much dough for each roll as can be conveniently shaped in the hand. Many persons use hot water; in Winter it is certainly best. The bread is better to be made half an

hour or more before it is baked. The oven must be tolerably hot when the dough is put in. All kinds of corn bread require a hotter oven, and to be baked quicker, than flour.

2. Take half a pint, *good measure*, of white Indian meal, which should be rather coarsely ground. Mix it thoroughly in a large bowl with one pint of fresh milk, and don't imagine, because it seems so thin, that a mistake has been made in the directions, but do as you are bid. Put in what salt is necessary, and into the batter break one fresh egg, and with a kitchen fork beat the whole together quickly and thoroughly. Have your oven pretty hot, but not scorching. Into a splayed-sided round tin pan, of say four inches in diameter at the bottom, and two and a half to three inches deep, pour your batter (which will about half fill the pan), and put it into the oven instantly. It ought to bake, if the heat is properly regulated, in about half an hour. It must be perfectly *done* to be good. Don't be discouraged with the first attempt; it requires some practice to *hit it* precisely, but when this is done, it is "good enough to make a man hit his father." It is to be eaten hot, before the upper crust falls. In making this bread, remember that no saleratus, soda, or yeast, of any kind, is to be used.

Astor-House Corn Bread.—One quart of buttermilk, two eggs, two ounces butter, one-fourth ounce saleratus, and stir in meal till the mixture is about as thick as buckwheat batter. Bake in square tin pans an inch thick, half an hour, in a hot oven.

Steamed Corn Bread.—Pour boiling water over two quarts of Indian meal, enough to just wet it; when cooled a little, add one pint of sour milk, half a cup of molasses, one tea-spoonful of soda, one pint of Graham flour, and salt to suit the taste. Mix well; put the mixture into a two quart basin, after it has been covered, steam it three or four hours. This bread can be warmed very soon by replacing it in the steamer for ten or fifteen minutes. If preferred, a half pint of sweet milk and a half pint of yeast can be used instead of the sour milk and soda.

Water-Cure Corn Bread.—For making Indian cake, bread, mush, or pudding, the fine meal should never be used. It will not cook as lightly, nor be as sweet or palatable. What is called coarse meal should always be selected; and it should always, if possible, be fresh ground. This may be wet up with warm water, sweetened moderately or not, according to taste,

and raised with sour milk and supercarbonate of soda. It must be well baked.

Unleavened Corn Bread.—Stir thoroughly together one quart sweet milk and one quart corn meal—which is much improved by faithful beating—and a little salt. These proportions, owing to the difference in corn meal, will not hold good in all cases; a little practice and observation will set the matter right. This unleavened corn bread, upon fair trial, will be found to be more palatable, nutritious, wholesome, and economical than raised bread, and can be made much more expeditiously.

Hoe-Cake and Corn-Dodger.—The hoe-cake is nicest baked before the coals—that is, *a la mode*. It is simply a mixture of salt, meal, and water, made thick, and can be baked in a frying pan. The dodger is the same, only thinner, and fried brown in a skillet or spider. The knack is to turn smoothly. If the meal is good, one gets in these mixtures a peculiar flavor and sweetness not discernible with the addition of other compounds.

Johnny-Cake.—1. Scald coarsely-ground yellow corn meal, stir in an even table-spoonful of salt, and two spoonsful of any cooking fat to each pound of meal. Make the batter so stiff that it will lift heaping on a spoon. Have a dripping pan as hot as it can be handled, and well greased. Lay in the batter an inch thick, and bake in a quick oven till the crust is a rather dark, rich brown.

2. One cup sweet milk, one cup buttermilk or sour milk, half cup molasses, one cup flour, two cups meal, one tea-spoonful of salt, one tea-spoonful of saleratus, one tea-spoonful of caraway-seed, mix them all together, and bake quick in a hot oven, twenty minutes, or longer if necessary.

Wedding Johnny-Cake.—One pint sour cream, the same of sweet milk, half a cup butter, three eggs, table-spoonful of salt, same of soda, one quart of meal, one pint of flour, one pint of raisins, half pint of citron. This makes a very large cake, and is delicious; and if one does not marry more than once in a life-time he can well afford to make it.

Rye and Indian Johnny-Cake.—Two cups each of rye flour and Indian meal, a small tea-spoonful of saleratus, a little salt, with sufficient sour milk to make a stiff batter. Bake in cakes on a griddle; split open and butter them, and send to the table hot.

Biscuits, etc.—Under this general head we shall give directions for making the various

kinds of warm table bread, known as biscuit, rolls, buns, rusks, muffins, short-cakes, crullers, crumpets, lunnis, puffs and pop-overs.

Good Biscuit.—Two tea-spoonsful cream of tartar, one table-spoonful soda, half table-spoonful of salt, rubbed fine, and well mixed with one quart of flour. Rub in a piece of butter the size of an egg, mix up soft with thick sour milk or buttermilk, and bake quickly.

Soda Biscuit.—One quart of sifted flour, a little salt, a table-spoonful of butter, well rubbed through the flour, two small tea-spoonsful of cream of tartar, sprinkled through the flour dry, one tea-spoonful of soda, dissolved in hot milk or water, and as much milk as will make it a soft dough. Knead it upon the pasteboard for five minutes, cut them out, and bake in a quick oven.

Fancy Biscuit.—Reduce one pound of blanched almonds to powder, and moisten with orange-flower water until you have a smooth paste; add a little fine flour and mix well, and then place in a pan over a slow fire; stir the mass constantly to prevent burning, until it becomes hard enough not to stick to the fingers; then mold it into various sorts of fancy shapes. Now make an icing of various colors and dip your forms to suit color and taste, and set them upon a clean sieve to dry. You may make them still more fanciful, by strewing over them different colored pistachio nuts. To be served with nuts and cakes, at evening parties, or any other extraordinary occasion.

Cream Biscuit.—Break six eggs, separate the yolks and whites, beat the former with six ounces of powdered sugar, and the same of flour; whisk the whites, and then mix them together; add to it whipped cream in proportion to the sugar and flour, stir it carefully; pour this into molds or paper cases, and bake.

Sugar Biscuit.—Three pounds of flour, three quarters of a pound of butter, one pound of sugar, one quart of sponge. Rub the flour, butter, and sugar together, then add the sponge with as much milk as will soften the dough. Knead well and replace it in the pan to rise. This must be done in the afternoon; next morning knead lightly, make it into small cakes, about the size of a silver dollar, and half an inch in thickness; place them on slightly buttered pans one inch apart each way, set them in a warm elevated place to rise; when done wash them over with a little water, not having the brush too wet, and let them remain in the tins until cool.

Egg Biscuit.—Beat separately the whites and

yolks of twelve eggs; mix, and add one and a half pounds of powdered white sugar; whisk all into bubbles; add one pound of flour and the grated rinds of two lemons. Fill buttered tin molds; grate sugar on top; bake one hour in a quick oven.

Squash Biscuit.—One tea-cupful of strained squash, two table-spoonsful of sugar, one table-spoonful of melted butter, a little salt, one tea-spoonful of soda, one cup of sour milk; flour to roll out. Serve hot for tea.

French Tea Biscuit.—Two pounds of flour, two ounces butter, half a pint of milk, one egg, half a cup of sugar, and one cup of yeast.

Graham Biscuit.—1. Take a quart of Graham or unbolted flour, and mix it to the consistency of drop-cake with buttermilk or sour milk, an even tea-spoonful of butter, a tea-spoonful of soda, and drop the mixture on a shallow pan; bake in a quick oven fifteen or twenty minutes.

2. Make Graham mush as for the table. When cool, mix with it Graham flour sufficient to roll well. Knead for a few minutes, roll three-fourths of an inch thick, cut with a common biscuit cutter, and bake in a hot oven from thirty to forty-five minutes.

3. Stir into cold water, Graham flour enough for a rather soft dough; knead it for five or ten minutes, and bake.

When these have become a little dry or hard, cut in small pieces, cover with cold water, soak till thoroughly soft, when the water should be all absorbed. Strain through a colander, mix Graham flour sufficient to roll and bake in the same form as at first. This is even superior to the original bread.

Rye Biscuit.—One cup of wheat flour, two cups of rye flour, four table-spoonsful of molasses, half a tea-spoonful of saleratus dissolved in the molasses, two tea-spoonsful of yeast-powder, put into the rye and wheat flour a little salt; mix with milk; set through the night, and it is ready to bake in the morning.

Elegant Breakfast Rolls.—Take one pint sweet milk; two pints of flour; two table-spoonsful of butter; four table-spoonsful of yeast, and half a tea-spoonful of saleratus. Beat thoroughly, and let it rise all night. Pour into shallow pans, and bake about half an hour.

French Rolls.—Add two ounces of butter and a little salt to a pint of milk; while tepid, sift in one pound of flour, one beaten egg, one table-spoonful of yeast—beat these well together; when risen, form the rolls with as little handling as possible, and bake on tins.

Flannel Rolls.—One cup sweet milk; whites

of two eggs, two-thirds cup butter, flour to make a thick batter, half cup yeast, and two table-spoonsful sugar. Raise over night, adding the eggs and butter in the morning.

Potato Rolls.—Boil two pounds potatoes, pass through a colander, or mash them well; add two ounces butter and a pint of milk, a little salt, one gill yeast, and as much flour as will make a soft dough; set them to rise. When light, cut them in cakes; let them rise one hour, and bake. Sweet potatoes make beautiful biscuits mixed as above.

Corn Rolls.—Take a quart of meal, a spoonful of lard, and two spoonsful of yeast; mix with warm water until the dough is quite soft. Set it in a warm place at night to rise, and bake it in a pan or in cakes in an oven for breakfast.

Banbury Buns.—Prepare some dough with two table-spoonsful of thick yeast, a gill of warm milk, and one pound of flour. Let it work a little, and mix with it one-half pound of currants washed and picked, the same weight of candied orange and lemon-peel, cut small; one-quarter ounce of allspice, and the same of ginger and nutmeg; mix all together with one-half pound of honey. Put it into puff paste cut in an oval form; cover it with the same, and sift sugar over the top. Bake these cakes for a quarter of an hour in a moderate oven.

Philadelphia Buns.—One pint of milk, one cup of butter, one pint of yeast, three cups of sugar, one egg, make a soft dough at night. Early in the morning add not quite a tea-spoonful of soda and two tea-spoonsful of ammonia. Now put in a little more of flour, mold it well, and return it to rise. When light, make into cakes, and let them stand half an hour, or till light enough, then bake them.

Tea Table Buns.—"Buns that are buns" may be made as follows: One pound of flour, three lemon rinds grated fine, half a pound of butter, melted in a coffee-cup, a tea-spoonful of yeast, three eggs well beaten, half a pound of finely-powdered white sugar. Mix and work it well; let it stand until raised, and then make out three dozen buns; bake and eat, when you will say they are good.

Rusk.—1. Beat together two cups sugar and two eggs; heat a pint of new milk with a small piece each of butter and lard; pour it boiling hot over the eggs and sugar; half a nutmeg; add flour enough to stiffen it; raise with yeast or bread sponge; bake as other rusk.

2. One pint of milk, one tea-cupful of butter, one cup of sugar, one cup of yeast; mix

stiff, and set in a warm place to rise for three hours.

3. One quart of sweet milk, lukewarm; one cup of melted butter, one cup of sugar, one cup of yeast, nine eggs; set to rise until quite light, then knead them down with sufficient flour to make a loaf; then set to rise again; when raised until quite light, make out in small rolls; let them stand until again light, then bake fifteen minutes in a quick oven.

Dried Rusk.—Take sugar biscuits which have been baked the day previous, cut them in half between the upper and under crusts, with a sharp knife. Place them on tins, and soon after the fire has ignited, put them in the oven, and as the heat increases, they become gradually dried through. When light brown, they are done. These are universally liked by the sick.

Muffins.—1. To two and a half cups of flour, one pint of milk, two table-spoonfuls of melted butter, and a little salt, and two eggs, beating the yolks and whites separately, and putting in the white portion just before placing the muffins in the oven.

2. Take one egg well beaten, a piece of butter an inch square, one cup of milk, one table-spoonful of soda, and two of cream of tartar; stir in flour till it is a stiff batter; pour it into rings, or into a flat pan cut into squares.

3. One quart of milk made a little warm, four or five eggs, a piece of butter the size of an egg, yeast and flour; to be set at night for the next afternoon, if your yeast will not rise quick; if your yeast rises soon, set in the morning—bake in rings on the griddle.

Water-Cure Muffins for Tea.—Take one pint of morning's milk and cream from a two-quart basin, two eggs; thickening with superfine flour, Graham, or corn meal, to the consistency of griddle cakes; give the whole a good beating, and bake in iron muffin pans, placed upon the stove and heated quite hot, previously to putting in the batter; then bake in a brisk oven fifteen minutes. Not good in tin.

For Plainier Ones.—One pint of water, one egg, unbolted flour; same consistency; give them a good beating to introduce the air, which insures lightness.

Corn Muffins.—One quart of Indian meal, one quart of sweet milk, one table-spoonful of butter, one of molasses, and a little salt; a tea-cup of home-brewed yeast, though more will not hurt it. Let it rise not less than four or five hours, if for tea; but set at bedtime, if for breakfast. Bake in greased rings in the oven instead of on a griddle, as many do.

Or, one pint of fine Indian meal, one of wheat flour, four eggs, one gill of yeast, a little salt, as much warm milk as will make the whole into a thick batter. Mix the Indian and wheat flour together, stir in the milk, then the yeast, and lastly the eggs, after they have been well beaten. When the batter is light, grease the griddle and muffin rings; place the rings on the griddle; pour in the batter, but do not fill them; bake them brown on both sides, and serve them hot. If for breakfast, set to rise the night previous; if for tea, about two o'clock.

Mush Muffins.—Make mush as you ordinarily do, and when cold, thin it with one quart of milk, and stir in a few handfuls of wheat flour, seven eggs, and butter the size of an egg, also some salt. Bake in rings.

Rye Drop-Cakes.—Rye drop-cakes are an excellent and healthy bread for breakfast. Here is a simple rule: Beat three eggs very light, add one quart of milk, a large pinch of salt, stir in a handful of flour; then rye till the mixture is stiff enough to hold up the spoon; pour it into a French roll pan, or into muffin rings, and bake fifteen minutes.

Little Short-Cakes.—Rub into a pound of dried flour four ounces of butter, four ounces of white powdered sugar, one egg, and a spoonful or two of thin cream to make into a paste. When mixed, put currants into one-half, and caraways into the rest. Cut them as before, and bake on tins.

Delicious Breakfast-Cake.—One quart of sweet milk, two eggs, a small tea-spoonful of salt, and one pint of sifted corn meal. No more nor less. Bake forty minutes in a quick oven. It will take an hour if baked in a slow oven.

Strawberry Short-Cake.—Into three pints of flour, rub dry two tea-spoons heaping full of cream of tartar; add half a cup of butter, a little salt, one tea-spoon of soda dissolved in a pint of milk and water. Mix quickly and thoroughly, roll to an inch in thickness, and bake twenty minutes in a quick oven. Take a quart of strawberries, and add cream and sugar to make a sauce. For this purpose, small sized, rather acid berries, with sprightly flavor are preferable. When the short-cake is done, divide it in three layers, butter them, and spread the strawberries between. Eat while warm.

Or, make nice biscuit dough, roll it out large or small, to suit the size of your family. Bake in a quick oven, then split it open, butter, and spread thick with strawberries and sugar, and put on the upper crust. Have sweet cream in a pitcher for those who like it.

Raspberry Short-Cake.—Make in the same way as for a strawberry-cake, only cooking the berries a little while with sugar, before spreading them on the cake. This is delicious; and more healthful than pie.

Potato-Cakes.—Take two pounds of very mealy boiled potatoes, mash them very fine with a little salt, mix them with two pounds of flour, and milk enough to make this into dough, beating it up with a spoon and put in a little yeast. Set it before the fire to rise, and when it has risen divide it into cakes the size of a muffin, and bake them. These cakes may be cut open and buttered hot.

Oaten Bunnocks.—Oaten bunnocks are made by mixing the meal with water and a little salt, and baking in little patty-pans about twenty minutes, or they may be baked on a griddle.

Out Meal-Cake.—Wet meal with water. Cut in small shapes, with a cooked raisin in the middle. Bake in the oven.

Crullers.—Four heaping, large spoonsful of sugar, four of melted butter, two or three eggs, one cup of sour milk, one even tea-spoonful of soda, with a little salt and spice to your taste, and as much flour as needed to mix up soft, and bake.

Crumpets.—Make two pounds of flour into a dough with some warm milk and water, adding a little salt, three eggs well beaten, and three table-spoonsful of yeast; mix well and add sufficient warm milk to reduce to the consistency of thick batter. Place it before the fire to rise, and bake in rings on the top of the stove.

Sally Lunn Tea-Bread.—Take a stone pot, pour in one pint bowl of sweet milk, half a tea-cup of baker's or other yeast, one quarter of a pound of melted butter, a little salt, and three beaten eggs. Mix in about three pint bowls of flour. Let it stand several hours, or until quite light; then put it into Turk heads or other tin pans, in which it should again rise up before being shoved into the oven, to be "brought out" and presented to your friends as the beauty and belle of the evening.

Or, two eggs, one cup of milk, one cup of sugar, three of flour, butter the size of an egg, three tea-spoonsful cream of tartar, and one and a half tea-spoonsful of soda. Bake in little round tins, and eat hot for tea.

German Puffs.—One pint of milk, three eggs, one pound of flour, one dessert-spoonful of dissolved saleratus, a tea-spoonful of butter, a salt-spoon of salt. Beat the yolks and the whites of the eggs separately. The yolks must be as thick as batter, and the whites perfectly dry.

Add to the yolks half the milk and half the flour, stir it well until the batter is smooth, then add the remainder of the flour and milk. Warm the butter and stir in, and beat the batter thus made till it is light and full of bubbles. Stir in the saleratus, and lastly the whites—but do not beat it after the whites have been added, as that will make it tough. Butter tea-cups or an earthen mold, pour in the batter, and bake it in a moderate oven. Serve with butter and sugar, or any kind of sauce which may be preferred. They require from half an hour to three-quarters to bake.

Indian Puffs.—Into one quart boiling milk stir eight spoonsful of Indian meal, and four spoonsful of sugar. Boil five minutes, stirring constantly; when cool add six well-beaten eggs. Bake in buttered cups half an hour.

Pop-Overs.—Four eggs, four cups each of milk and flour, melted butter the size of two nutmegs, and a little salt. Bake in small tins, and eat with sauce.

Water Cure Wheat-Meal Crisps.—Make a very stiff dough of Graham flour and cold water; knead thoroughly, roll as thin as possible and bake for twenty minutes in a hot oven.

Crackers.—1. One quart of flour, with two ounces of butter rubbed in; one tea-spoonful of saleratus in a wine-glass of warm water; half a tea-spoonful of salt, and milk enough to rub it out. Beat half an hour with a pestle, cut it into thin round cakes, prick them, and set them in the oven when other things are taken out. Let them bake till crisp.

2. One pint of water, one tea-cup of butter, one tea-spoonful of soda, two of cream of tartar, flour enough to make as stiff as biscuit. Let them stand in the oven until dried through. They do not need pounding.

Plain Crispy Crackers.—Make a pound of flour, the yolk of an egg, and some milk, into a very stiff paste; beat it well and knead till quite smooth; roll very thin, and cut into biscuits. Bake them in a slow oven till quite dry and crisp.

Hard Crackers.—Warm two ounces of butter in as much skimmed milk as will make a pound of flour into a very stiff paste; beat it with a rolling-pin, and work it very smooth. Roll it thin, and cut it into round biscuits; prick them full of holes with a fork. About six minutes will bake them.

Tea Crackers.—Three tea-cupsful of flour, one of lard, one of water, a large tea-spoonful of salt; mix all together, put it on the pie-board and work it well, adding flour until stiff, short,

and perfectly smooth. Roll out as thin as a knife-blade, prick it with a fork, and bake well but not brown.

Soda Crackers.—Take flour, two quarts; butter, one cup; water, one pint; cream of tartar, three tea-spoonsful; soda, one and a half tea-spoonsful. Mix the cream of tartar thoroughly with the flour, then rub in the butter, and add the water and soda together. Knead about the same as pastry for pies. Roll out a little more than the eighth of an inch thick, cut in squares, and prick them all over. Bake in a hot oven about twenty minutes, or until dry. Wash the oven bottom clean, and put the crackers on it, for they will not bake well on tins.

Sweet Crackers.—One tea-cupful of coarse wheat meal, one of sour milk or buttermilk, three-fourths of a tea-cup of sugar, half a tea-spoonful of pearlsh; made hard, rolled thin, and well baked.

Graham Crackers.—Mix cold water and Graham flour together, a little salt, and knead very thoroughly—their good quality depending almost entirely upon the thoroughness of kneading or pounding.

Batter Cakes—The griddle may be prepared for baking cakes without the use of grease. Cut a turnip in two parts and pass one over the warm griddle. It answers the purpose of grease, without its disagreeable smell. A soap-stone griddle may be rubbed before every batter of cakes with a salted rag.

Pan-Cakes.—Put in a basin, one-fourth pound of sifted flour, one egg, one-fourth gill of milk; stir to a smooth paste; then add one gill and three-fourths of milk, two ounces of fresh butter melted, and a small pinch of salt; mix well, and if lumpy, strain this batter. Put a small piece of butter in a pan-cake pan; when melted, pour in two table-spoonsful of the batter, spread it so as to cover the pan entirely; fry till colored on one side, then toss it over and cook the other side, and turn the pan-cake out on a dish. When all the batter is cooked in this way, sprinkle the pan-cakes with sugar, and serve on a very hot dish, with a cut lemon. Pan-cakes should be eaten as soon as fried.

New England Pan-Cakes.—Mix a pint of milk, five spoonsful of fine flour, seven yolks and four whites of eggs, and a very little salt; fry them very thin in fresh butter, and between each strew sugar and cinnamon.

Buttermilk-Cakes.—Two cups of buttermilk or sour milk, one cup of sugar, one piece of butter the size of a walnut, a tea-spoonful of saleratus,

with as much flour as will make a thin batter. Spice to your taste, and bake.

Bread Griddle-Cakes.—Place dry bits of bread in a tin pan with sweet milk; place it on the stove and let it soak until very soft; strain through a colander, add three or four beaten eggs to each quart of the soaked bread, and a little sour milk, salt, and soda; thicken with flour sufficient to bake on a griddle. Bring them to the table while hot, and serve with butter and sugar or molasses. It is a very economical way of saving the dry pieces of bread.

Soda Griddle-Cakes.—One pint of milk, two tea-spoonsful of cream of tartar, one tea-spoonful of soda; flour to make a thin batter. Fry on a griddle.

Strawberry or Huckleberry Griddle-Cakes.—Stir an even tea-spoonful of soda into two quarts of sweet milk, one tea-spoonful of salt, one pint of ripe berries, with flour to make a thick batter; bake on a griddle as other cakes.

Potato Griddle-Cakes.—One quart of milk, six cold boiled Irish or sweet potatoes grated, two eggs, and flour sufficient to make a batter.

Rice Griddle-Cakes.—Stir a pint of soft-boiled rice into a pint of milk, with two well-beaten eggs; mix with corn meal or wheat flour till stiff enough to fry. By adding another egg, and sufficient flour, the mixture can be rolled out, cut into cakes, and baked.

Rice Patties.—Mix the rice which may be left from dinner with a little egg and flour, make into patties with the hand, dip them into a beaten egg, and roll them till thoroughly coated in Indian meal, and fry in the skillet. They make an excellent change for the breakfast table; or a nice dessert, served with sauce, or cream and sugar.

Rye Batter-Cakes.—Six heaping table-spoonsful of rye and six of Indian meal, three of flour, with two tea-spoonsful of cream of tartar, mix well, then add two table-spoonsful of molasses, a tea-spoonful of salt, and a tea-spoonful of soda in a scant pint of water; stir well, and if this quantity of water does not thin the batter sufficiently, add a little more. They are very nice made of sour or buttermilk instead of cream of tartar and water. They should be about as thick as the batter for pan-cakes. Grease the griddle well to prevent them from adhering, and fry to a nice brown. Very nice for breakfast or supper, and may be eaten with butter or syrup.

Corn Meal Griddle-Cakes.—Take, at night, one quart of Indian meal, about half scald it with boiling water, then cool it with cold water so

as not to kill the brewer's yeast, one tea-spoonful of which is stirred in, with a teaspoonful of wheat flour, and a tea-spoonful of salt. Sufficient water must be put in to make a thick batter, and left to rise till morning; then add saleratus enough to sweeten the mass. Two or three eggs beaten and stirred in is an improvement. Then bake on a hot griddle, and you have breakfast cakes fit for a queen.

Mush-Cakes.—Beat the yolks of six eggs very light, add one pint of milk, two pints of mush almost cold, one and a half pints of flour, one tea-spoonful of salt, three table-spoonfuls of melted butter. To be well beaten together. Just before frying them, whip the whites to a strong froth, and stir it lightly into the batter. One spoonful in each cake. Do not let them touch in baking.

Hominy-Cake.—Mix with hominy an equal amount of wheat flour until perfectly smooth; add a tea-spoonful of salt, and thin off with buttermilk into a pan in which a tea-spoonful of soda has been dissolved; when of the consistency of griddle-cakes, add a dessert-spoonful of melted butter, and bake brown on the griddle. With maple syrup, or sugar and cream, they are delicious; and the absence of eggs will not be missed.

Buckwheat-Cakes.—A lady of culture, refinement, and unusual powers of observation and comparison, became a widow. Reduced from affluence to poverty, with a large family of small children dependent on her manual labor for daily food, she made a variety of experiments to ascertain what articles could be purchased for the least money, and would at the same time go the farthest, by keeping her children longest from crying for something to eat. She soon discovered that when they ate buckwheat-cakes and molasses they were quiet for a longer time than after eating any other kind of food. A distinguished judge of the United States Court observed, that when he took buckwheat-cakes for breakfast, he could sit on the bench the whole day without being uncomfortably hungry; if the cakes were omitted, he felt obliged to take a lunch about noon. Buckwheat-cakes are a universal favorite at the Winter breakfast-table, and scientific investigation and analysis have shown that they abound in the heat-forming principles; hence nature takes away our appetite for them in Summer.

1. The finest, tenderest cakes, can be made by adding a little unbolted wheat or Graham flour, or coarse Indian meal, in the buckwheat. Less than a quarter will do. Mix with cold

sour milk, or fresh (not sweet) buttermilk is the best. The soda (yeast is dispensed with) when put in cold batter will not act satisfactorily. Bake at once. The heat will start the effervescence, and as the paste rises it will bake, thus preventing it from falling. Hence the culminating point of lightness is attained. The batter rises snowy and beautiful, and the pancake will swell to almost undue dimensions, absolutely the lightest and tenderest that can be baked, with not a touch of acid. More salt, however, must be admitted than usual to counteract the too fresh taste, when soda alone is used. Thus the bother of the yeast is all dispensed with. Pan-cakes in this way can be baked at any time, and on the shortest notice. Keep the Graham and buckwheat flour mixed ready for use. Some add one or two table-spoonfuls of molasses, to give the cakes a brown color; but it detracts somewhat from the peculiar buckwheat relish.

2. To one quart of buckwheat flour add half a cup of yeast, a cup of cream, a table-spoonful of salt, and make a thin batter with warm water. After beating these well together, set the mixture to rise for about eight hours.

3. One quart of buttermilk, a tea-spoonful of soda, a table-spoonful of salt; if wanted daily for breakfast, make a batter and put in half a cup of yeast; then add the flour and water to them each evening, and they can be ready all Winter.

Extempore Buckwheat-Cakes.—A quart of buckwheat, one pint of Graham flour or Indian meal, one table-spoonful of carbonate of soda; dissolve in water enough to make a batter, and when mixed, add a table-spoonful of tartaric acid dissolved in a few spoonfuls of hot water. Mix it and bake immediately.

Recooking Buckwheat-Cakes.—Cold cakes may be rendered excellent by taking a suitable quantity of milk, and adding to it say one-twentieth part of its bulk in butter, and heating the two together over the fire till hot, but not scalding, and then laying in the cakes and turning them over.

Green Corn Batter-Cakes, or Imitation Oysters. Take three dozen ears young Indian corn, six eggs, lard and butter in equal proportions for frying. Grate the corn down fine as possible and dredge it with flour. Beat the eggs light and mix them gradually with the corn, add a salt-spoon of salt, and beat the whole very light. Put into a frying pan; the lard and butter mixed; when boiling hot, put in the corn-cakes, made oval-shape, three inches long and

nearly an inch thick. Fry them brown, and send to table hot. In taste, they have a singular resemblance to oysters; they make nice side-dishes at dinner, and are good at breakfast.

Or, take young green corn and grate it in a dish; to one pint of this add two eggs well beaten, a small tea-cupful of flour, half a cup of cream, and a spoonful of butter, and some salt and pepper; mix them well together. A table-spoonful of this will make the size of an oyster. Fry them a little brown, and when done butter them, but when *fried in butter* it is sufficient. Sweet corn is preferable.

Fritters.—To three tea-cupful of buttermilk, add three table-spoonsful of rich cream and a small quantity of sugar. Stir in flour until it is of the consistency of paste for doughnuts. Roll out the size of a large breakfast plate, and fry in lard to a rich brown color. As each cake comes from the fire cover with apple sauce, made from tart apples sweetened to taste, and spiced with nutmeg or cinnamon, and continue the process until the plate is well heaped.

Apple Fritters.—Peel and slice crossways, a quarter of an inch thick, some apples, remove the core, and dip them one after the other in the following batter: Put in a basin about two ounces of flour, a little salt, two tea-spoonsful of melted butter, and the yolk of an egg, moistened by degrees with water, stirring all the while with a spoon, till forming a smooth consistency to the thickness of cream, then beat the white of the egg till firm, mixing it with the batter; it is then ready to fry. Use any fruit as fritters.

Cream Fritters.—Mix a pint and a half of flour with a pint of milk; stir in six well-beaten eggs; add half a nutmeg, then two tea-spoonsful of salt, and a pint of cream; stir the whole just enough to intermix the cream, then fry in small cakes. The addition of a few apples chopped fine improves the fritters.

Clam or Oyster Fritters.—Strain them from the juice, chop the clams or oysters, put pepper and salt, add an egg or two, a little cream or milk, sift in flour enough to make them stick together. This is the most delightful way of cooking clams especially.

Fruit Fritters.—Make any plain batter for pan-cakes, by dropping a small quantity into the pan; put pared apples, sliced and cored, into the batter, and fry some of it with each slice. Currants, or sliced lemon as thin as paper, make an agreeable change. Any sort of sweetmeat, or ripe fruits, berries, or currants, may be made into fritters.

Fried Cakes, Crullers, or Doughnuts.—1. Three pounds flour, one pound sugar, three-quarters of a pound butter, four eggs, one-half tea-cup baker's yeast; rub the butter well into the flour, then add sugar and spice to taste; beat the eggs light, and pour into the mixture; add the yeast and then put in one and a half pints of milk to make a soft dough, cover and set to rise at bedtime to cook next day. They should be kneaded twice. Sprinkle with powdered sugar when cooked.

Or, just before immersing them in the hot fat, plump them into a well-beaten egg. This will give a thin coating of albumen, which will keep out the grease effectually. Furthermore, this coating will retain the moisture, and make them keep in good condition much longer than if not thus treated. If not thus coated let the fat be very hot, as the hotter it is, the less of it the cakes absorb; and the larger the quantity of fat in the dish, the less it will cool as the cakes are thrown in, and hence the less fat the cakes absorb.

2. One pint-bowl of raised dough wet with milk; knead in a tea-cup of sifted sugar, two eggs and a heaping tea-spoonful of butter; let it rise again, roll and fry; fresh chopped orange peel is the best seasoning.

3. Four eggs, three cups of sugar, one cup of milk, half cup of butter, one tea-spoonful of cream of tartar, half a tea-spoonful of soda, with flour enough to make a stiff dough.

Poor Man's Jumbles.—Two bowls of flour, one of sugar, one-half of sour cream or buttermilk, a little soda, and some cinnamon; to be rolled thin, and fried in hot fat or butter.

Snow-Balls.—Two cups full of sugar, one-half cup of butter, one of buttermilk, one of sweet milk, and one of thick sour cream, two eggs, one tea-spoonful of saleratus. Roll and cut out with the top of a tea-caddy. Put one raisin in the center of each, and roll into a ball with the hand. Fry in hot lard, and roll in pulverized sugar. They will keep in a crock for several weeks, and are always pretty and good.

Varieties.—Two eggs beat light, a tea-spoonful of salt, the egg thickened with flour to roll out thin as a wafer; cut in strips one inch wide and four inches long, wind it round your finger, and fry them as you do doughnuts.

Pan Doddings.—Three tea-cupsful of fine rye meal, three tea-cupsful of Indian meal, one egg, three table-spoonsful of molasses; add a little salt and allspice; sufficient sweet milk to form a batter stiff enough to drop from a

spoon. Fry them in hot lard until a nice brown.

Corn-Meal Crullers, or Doughnuts.—1. Beat four eggs light, and pour on them one quart of sour milk (if sweet milk, cream of tartar must be used); add half a tea-spoonful of salt, and a small tea-spoonful of soda; stir them all together, and then stir in sifted corn meal enough to make a very stiff batter. Have ready a frying-pan half full of hot lard, into which drop the batter from a spoon; when nicely browned, turn them over, and when done lay them on a colander to drain, and send to the table hot.

2. A tea-cupful and a half of boiling milk, poured on two tea-cupsful of sifted Indian meal. When it is cool add two tea-cupsful of wheat or Graham flour, one tea-cupful of butter, one and a half of sugar, one of yeast, and two eggs, with a table-spoonful of cinnamon, or a grated nutmeg. If not sufficiently stiff, add equal portions of flour and Indian meal. Let it rise till very light. Roll it about half an inch thick, and cut it into small diamond-shaped cakes, and cook them in lard.

Waffles.—Four eggs, one quart of sweet milk, a cup of rich cream, four ounces of butter, one pound of flour, two ounces powdered white sugar, four table-spoonfuls of yeast, and a salt-spoonful of salt. Beat the eggs to a froth. Put the butter in the milk, and warm it until the butter dissolves. When the milk is cooled sufficiently, put in the eggs, and stir in the flour, after which add the yeast and salt. When light, pour the batter in the hot waffle-iron, having first greased it well, or rubbed it with salt. Bake them on both sides, by turning the iron. To be well buttered, and served hot.

Or, one quart of milk, five eggs, one and a quarter pounds of flour, half a pound of butter; beat well together; if you make before time to bake, put in one spoonful yeast. If wanted immediately, instead of the yeast, use a tea-spoonful of cream of tartar, and half a tea-spoonful of soda. Waffles should be wet with cream or milk, or sauce, as fast as baked, sifting on them cinnamon and sugar.

Corn-Meal Waffles.—Boil two cups of hominy very soft, add an equal quantity of sifted Indian meal, a table-spoonful of salt, half a tea-cup of butter, and three eggs, with milk sufficient to make a thin batter. Beat all well together, and bake in waffle-irons. When eggs can not be procured, yeast is a good substitute: put a spoonful in the batter, and let it stand an hour to rise.

Rice Waffles.—A pint bowl of cold, well-boiled rice, mashed fine, thinned with cold cream or milk, one egg well beaten, a small piece of butter, and flour to make a stiff batter to bake.

Cakes.—So numerous are the cake recipes that we can only endeavor to make a judicious selection.

Frosting or Icing for Cakes.—Beat the whites of eggs to a full froth, with a little rose or orange-flower water; then add gradually as much finely-powdered sugar as will make it sufficiently thick, beating it all the time. Before using, dust the cake with flour, then gently rub it off, and lay on the icing with a flat knife and place in the oven for a few moments to allow it to harden, taking care to remove it before it becomes discolored by the heat.

Or, beat up the whites of five eggs to a froth, and put to them a pound of double-refined sugar, powdered and sifted, and three spoonfuls of orange-flower water, or rose water, and lemon juice, and a little gum-arabic. Keep boiling it all the time the cake is in the oven, and the moment it comes out, ice over the top with a spoon. Be careful to keep the sugar clean.

How to Bake Cake.—Have your oven well and evenly heated before putting in your cake, and do not allow it to cool. Keep up the heat at the same temperature, and avoid, if possible, removing the cake from the oven until it is done. Look not at the oven while the cake is baking—be sure you have it right, and let it be till ready to take out. To ascertain if the cake is done, take a piece of dry wood or skewer, pass it into the cake, and if it comes out dry, it is done.

How to Keep Cakes.—They keep best in tin canisters; wooden boxes, unless well-seasoned, are apt to give them a disagreeable flavor; brown paper should be avoided, for the same reason.

Almond-Cake.—Three-quarters cup of butter, two cups of sugar, two eggs, one cup of milk, one pint of flour, two tea-spoonfuls of cream of tartar, one of soda, two of yeast powder, one of extract of almond. Beat butter, sugar, and eggs together, add part of the flour with the yeast powder, before adding the milk.

Almond Cheese-Cake.—Blanch and pound four ounces of almonds, and a few bitter, with a spoonful of water; then add four ounces of sugar pounded, a spoonful of cream, and the whites of two eggs well beaten; mix all as

quick as possible; put it into very small pattypans, and bake in a pretty warm oven, under twenty minutes.

Apple-Cake.—If made of dried apples, soak over night two cups of apples; in the morning chop them fine, and boil in two cups of molasses, and when cold, add four cups of flour (or two each of flour and corn meal), one cup of sugar, one cup of thick cream, half a cup of butter, two eggs, a tea-spoonful of saleratus, with allspice, cloves, nutmeg, lemon, and rose water. A few currants improve it, but are not necessary.

Blueberry-Cake.—Four cups of flour, one cup of sugar, three eggs, half a cup of melted butter, one cup of milk, one and a half tea-spoonful of cream of tartar, and one tea-spoonful of soda. Beat the sugar and eggs together, rub the berries in additional flour, to prevent settling.

Bread-Cake.—Three cups of very light bread dough, three cups of sugar, one cup of butter, three eggs, a grated nutmeg, a coffee-cupful of raisins, one tea-spoonful of saleratus, dissolved in a little hot water. Rub the butter and sugar together; then add the eggs, nutmeg, raisins, and saleratus; mix thoroughly with the dough; let it stand to rise, after which bake in hot oven. Three or four table-spoonful of wine, and a cup of cream, much improve it.

Bread Cheese-Cake.—Slice up a large French roll very thin, pour on it some boiling cream or milk; when cold, add six or eight eggs, half a pound of butter melted, some nutmeg, a spoonful of brandy, a little sugar, and half a pound of currants; when mixed together, pour the mixture into puff paste, as other cheese-cakes.

Cake Without Eggs.—One cup of sugar, one cup of butter, nutmeg, one cup of cream or milk, two ounces of currants, or half a pound of raisins, one tea-spoonful of dry cream of tartar, one-half ounce of soda dissolved in milk; flour enough to make a batter.

California-Cake.—One tea-cupful of flour, one of sugar, three eggs, two tea-spoonful each of cream of tartar and of baking-powder, and one tea-spoonful of pulverized saleratus—the tartar, powder, saleratus, to be put in the mixture fine and dry; add a little salt, and the needful wetting, beat all together thoroughly, and bake quick for one hour.

Chocolate Cakes.—Beat the whites of two eggs with a quarter of a pound of pounded sugar, into a frothy cream; add the juice of half a lemon, and six ounces of finely-grated choco-

late. Drop this mixture in spoonfuls on a flat tin, and bake them slowly.

Cider-Cake.—One pound and a half of flour, half a pound of sugar, a quarter pound of butter, half a pint of cider, one tea-spoonful of soda. Spice to your taste. Bake till it turns easily in the pans, half an hour.

Cinnamon Wafers.—One pound of sugar, four ounces of butter, three eggs, half a tea-spoonful of soda, one table-spoonful of ground cinnamon, and flour enough to roll out; to be made the same as ginger snaps.

Cocoanut-Cake.—Take a cocoa-nut and grate it fine; put it in a porcelain dish or kettle and place it over the fire, and stir constantly until it is nearly dry as flour; then add a coffee-cup of powdered sugar, and the white of one egg, beaten to a froth. Mix well and make into small cakes, the size of a silver dollar, and place them on a sheet of white paper, previously buttered; bake them until slightly brown.

Coffee-Cake.—One cup each of coffee, sugar, molasses, and butter, one egg, one tea-spoonful each of soda and cream of tartar, one tea-spoonful each kind of spice. Fruit to the taste. Mix with flour not as hard as fruit-cake. When it rises even in the dish, and bakes right, it makes a splendid fruit-cake, and better by standing.

Cookies.—1. Stir a pound of sugar and three-quarters of a pound of butter to a cream; then add three beaten eggs, a grated nutmeg, two table-spoonful of caraway-seed, and a pint of flour. Dissolve a tea-spoonful of saleratus in a tea-cup of milk, strain, and mix it with half a tea-cup of cider, and stir it into the cookies—then add flour to make them sufficiently stiff to roll out. Bake them as soon as cut into cakes, in a quick oven, till a light brown.

2. A cup and a half of white sugar, the whites of two eggs, one cup of thick, sour cream; one-half tea-spoonful of saleratus, cinnamon, caraway, nutmeg, or spice to your taste.

Cookies without Eggs.—Three cups sugar, one cup sour cream or milk, one cup butter, a tea-spoonful of soda, a little caraway-seed, with flour enough to roll thin.

Cream-Cookies.—One pint of cream, two coffee-cups of sugar, three eggs, two tea-spoonful of soda, and four of cream of tartar; mix as soft as possible to roll it.

Corn Starch-Cake.—1. Whites of twelve eggs, three cups each sugar and flour, one cup each corn starch, butter, and milk, two tea-spoonful of cream of tartar, and one of soda; vanilla or lemon flavoring. Frosting improves it.

2. One and a half cups each of flour, sugar, and butter, half a cup each of milk and corn starch, half a tea-spoon each of soda and cream of tartar, the whites of three eggs beaten to a froth, and added just before the cake is put into the oven. Use lemon or other flavoring, and get a delicate bake.

Cup-Cake.—Take one cup of butter, two cups of powdered sugar, four cups of flour, five eggs, one cup of milk or sour cream (sufficient soda to sweeten), one nutmeg, one tea-spoonful powdered cinnamon. Beat the eggs, sugar, and butter (previously softened by heat) together, then add the other articles. Bake in small tins or cups.

Ginger Cup-Cake.—Three cups of flour, one of sugar, one of molasses, one of butter, a table-spoonful of ginger, one tea-spoonful of saleratus, and three eggs. Bake in pans. A pound of stoned or chopped raisins is an improvement.

Delicate-Cake.—One pound of powdered sugar, three-fourths of a pound of flour, six ounces of butter, whites of fourteen eggs beaten to a stiff froth, mace or bitter almonds grated. Bake in flat tins, from half to three-quarters of an hour.

Election-Cake.—Take a lump of raised dough the size of a pint bowl, and work into it one cup of white sugar, half a cup of butter, half a pound of raisins, stoned and chopped coarse; put it in a well buttered dish, and set it down to rise in a warm place. When risen bake it in a moderate oven. When it is taken from the oven wet the top over with molasses. This is the most wholesome cake made.

Egg-Cake.—Beat six eggs well, add a quart of sweet milk and a little salt, stir in flour until you have a nice batter, then, taking care to have your lard hot enough to brown them quickly, drop the batter in with a spoon, and serve them hot. Don't make the batter too thick.

Fruit-Cake.—1. One cup of butter (with salt washed out), three and a half cups light brown sugar, beat these ingredients to a cream. Put the yolks of three eggs into the mixture and beat all together. One cup of sweet milk, sift four cups of flour, in which mix one tea-spoonful of cream of tartar, and half a tea-spoonful of soda. Take some of this flour and rub it into one pound of clean, dry currants or raisins, and add them to the mixture, then gradually stir in the flour one-quarter of a nutmeg, and the grated rind of one lemon. Then add the beaten whites of the eggs. Pour into a pan lined and covered with white paper, and bake in a moderate oven.

2. Two and a half cups dried apples stewed until soft; add one cup of sugar; stew awhile longer, and chop the mixture, to which add one-half cup of cold coffee, one of sugar or molasses, two eggs, a half cup of butter, one cup of sweet milk, one nutmeg, one tea-spoonful of soda, and cinnamon and spices to taste.

3. Pour a pint of boiling water on three-quarters of a pound of fat salt pork, chopped very fine; let it stand till it cools, then add two cups of sugar, one of molasses, a pound and a half of raisins, five cups of flour, two tea-spoonful of soda, one table-spoonful of cinnamon, one-half a table-spoonful of cloves, and a cup of hickory-nut meats if convenient. More fruit and spice, and flavorings can be added if desired.

Gingerbread.—Take five cups of flour, two-thirds of a cup of butter, two cups of molasses, one cup of milk, one tea-spoonful of soda, and two tea-spoonful of ginger. This is a much-admired cake, especially when hot.

Hard Gingerbread.—One cup of butter, two cups of sugar, one-half cup of sweet milk, one tea-spoonful of saleratus, one egg, ginger, rose water. Flour to roll out. Cut in long cakes, and crease with a creased roller.

Soft Gingerbread.—One cup of sour milk, two cups of molasses, one tea-spoonful of ginger, a tea-spoonful of saleratus, a piece of melted butter as large as a hen's egg. Flour enough to make a thick batter. Pour into a flat tin and bake quick.

Ginger Nuts.—Two cups of molasses, one cup of sugar, one cup of shortening, one cup of buttermilk, a table-spoonful of soda, and a table-spoonful of ginger. Mix as soft as you can roll, and bake.

Ginger Snaps.—One cup of butter or lard, one cup of sugar, two cups of molasses, one egg, two-thirds of a table-spoonful of soda, three table-spoonful of ginger, and a tea-spoonful of cloves. Cut thin and bake quickly in a hot oven.

Ginger Sponge-Cake.—One cup each of molasses, butter, and milk, two cups of sugar, three cups of flour, four eggs, a little soda and ginger.

Gold-Cake.—One cup of brown sugar, one-half cup of butter, the yolks of four eggs, one whole egg, one-half cup of sweet milk, one and a half cups of flour, one tea-spoonful of cream of tartar, the yellow of one lemon and juice, one-half teaspoonful of soda, and nutmeg or vanilla to suit the taste.

Hard Times-Cake.—Take one cup of molasses

one cup of dried apples, and simmer together; one cup of sugar, one half cup of milk, two and one-half cups of flour, one egg, and one tea-spoonful of baking powder. This will be found to be a very palatable cake, and much more healthy for children than the richer cakes.

Jelly-Cake.—Spread or roll sponge-cake with jelly as soon as out of the oven, and lay the slices together.

Jumbles.—One pound of butter, one of sugar, two of flour, three eggs, half cup of sour milk, one tea-spoonful of soda. Roll in white-coffee sugar.

Lemon-Cake.—Four tumblers flour, two and a half tumblers of white sugar, three-fourths of a tumbler of butter, one tumbler of milk, two lemons' juice and grated rind, one heaping tea-spoonful of soda, three eggs beaten separately. A tumbler and a half of currants improves this cake.

Little White-Cake.—Dry half a pound of flour, rub into it a very little powdered sugar, one ounce of butter, one egg, a few caraways, and as much milk and water as to make a paste; roll it thin, and cut it with the top of a canister or glass. Bake fifteen minutes on tin plates.

Loaf-Cake.—Take three cups of sugar, three cups of butter, three eggs, and two grated nutmegs, or two tea-spoonsful of oil of lemon. Rub the sugar and butter to a cream and beat in the eggs; take out half of this mixture, and to the remainder add three cups of milk quite warm, and a little yeast, and stir in sifted flour enough to make it quite stiff. Allow this to stand several hours till perfectly light, then add the reserved portion of butter, sugar, and eggs; mix well together, and bake. By adding two pounds of raisins the cake will be very rich.

Macaroons.—Blanch four ounces of almonds and pound; whisk the whites of four eggs to a froth; then mix it and a pound of sugar, sifted, with the almonds, and a finely-grated lemon rind, to a paste; and laying a sheet of wafer paper on a tin, put it on in different little cakes the shape of macaroons.

Measure-Cake.—One cup of butter, two of sugar, three eggs, one-half a tea-spoonful of cream of tartar, and five cups of flour: Stir the butter and sugar to a cream, add the eggs, the whites and yolks beaten separately; then the soda and milk, and lastly the cream of tartar and flour. Flavor as you please. Bake in small tins or in a loaf.

Molasses-Cake.—Half a pound of butter, three-fourths of a pound of sugar, a pound and a half of flour, five eggs, a cup and a half of molasses,

two-thirds of a cup of milk, a tea-spoonful of saleratus, a pint bowl of stoned raisins.

Orange-Cake.—Two cups of flour, two of powdered sugar, five eggs, the whites of four, and yolks of five—saving one white for frosting—half a cup of boiling water, a little salt, one orange grated in, skin, juice, and all, half a tea-spoonful of soda, one cream of tartar, icing. Beat the whites stiff, stir in powdered sugar till stiff, grate in one orange, and spread on like jelly.

Plum-Cake.—One and a half pounds of butter beaten to a cream, three-quarters of a pound of sugar finely powdered; these must be beaten together until white and smooth; take six eggs (the yolks and whites to be beaten separately), when the whites are beaten to a stiff snow and ready to put to the cake, mix in the yolks, then add them to the butter; beat it enough to mix them; add to it one pound of flour, and one pound of currants; do not beat it much after you put in the flour; let it stand in a cold place for two hours; bake it about an hour and a half.

Little Plum-Cake for Long Keeping.—Dry one pound of flour, and mix with six ounces of finely-pulverized sugar; beat six ounces of butter to a cream, and add three eggs well beaten, half a pound of currants washed and nicely dried, and the flour and sugar; beat all for some time, then dredge flour on tin plates and drop the batter on them the size of a walnut. If properly mixed, it will be a stiff paste. Bake in a brisk oven.

Pound-Cake.—Beat a pound of butter to a cream, and mix with it the whites and yolks of eight eggs beaten apart. Have ready, warm by the fire, a pound of flour, and the same of sifted sugar; mix them and a few cloves, a little nutmeg and cinnamon in fine powder together; then by degrees work the dry ingredients into the butter and eggs. When well beaten, add a glass of wine and some caraways. It must be beaten a full hour. Butter a pan, and bake it a full hour in a quick oven.

The above proportions, leaving out four ounces of the butter and the same of sugar, make a less luscious cake, and to most tastes a more pleasant one.

Corn Meal Pound-Cake.—To one quart of sour milk add two tea-spoonsful of finely-powdered saleratus, well stirred in; two eggs well beaten, one table-spoonful of brown sugar, and a piece of butter as large as an egg. Salt to the taste, and then stir in the meal, making the mixture about as stiff as you would for pound-cake.

Now comes the secret of its goodness—*bake quick*, to the color of a rich light brown. Eat it moderately warm with butter, honey, molasses, or cheese.

Puff-Cake.—Two cups of sugar, three cups of flour, one cup of butter, one cup of sweet milk, three eggs, two tea-spoonsful of cream of tartar, and one of soda; flavor with lemon.

Queen-Cake.—Two cups of sugar, four cups of flour, one cup each of butter and sweet milk, and six eggs.

Rice-Cake.—Mix together half a pound of very soft boiled rice, a quarter of a pound of butter, one quart of milk, six eggs, and enough flour to form a thin batter.

Scotch-Cake.—One pound of brown sugar, one pound of flour, a half pound of butter, two eggs, cinnamon. Roll very thin and bake.

Snow-Cake.—One coffee-cup of sour cream, two and a half coffee-cups of flour, two coffee-cups of sugar, two table-spoonsful of butter, one pound of arrow root, one tea-spoonful of cream of tartar, half a tea-spoonful of soda, the whites of eight eggs beaten to a stiff froth, and flavoring to the taste. This is much quicker made than where butter is used instead of cream, as it requires no beating after the ingredients are together, but will not keep as long.

Sponge-Cake.—1. Three fresh eggs, one cup of sugar, one cup of sifted flour; eggs and sugar beat together from five to twenty minutes; when light, merely stir in the flour; make thin and bake, and roll with jelly; put in as soon as out of the oven.

2. One tea-cupful of sugar, one tea-cupful of milk, one tea-spoonful of cream of tartar, one pint of flour, two tea-spoonsful of soda, one egg, one table-spoonful of melted butter; salt, spice, and bake in thin sheets; when baked, spread jelly of any sort between the sheets. This makes one cake in three small divisions.

3. Take the weight of six eggs in sugar, half the weight in flour, the grated rind and juice of one lemon, a small tea-spoonful of salt. Beat the whites and yolks separately to prevent its looking streaked in the cake.

Another Way.—One tumbler of flour, one of sugar, and three eggs.

Tea-Cake.—1. With a pound of flour rub a quarter of a pound of butter; add the beaten yolks of two and the white of one egg, a quarter of a pound of fine loaf sugar, and a few caraway-seeds; mix it to a paste, with a little warm milk; cover it with a cloth, and let it stand before the fire for nearly an hour; roll out the

paste, and cut into round cakes with the top of a glass, and bake them upon floured tins.

2. Rub fine four ounces of butter into eight ounces of flour; mix eight ounces of currants and six of fine sugar, two yolks and one white of eggs. Roll the paste the thickness of a cracker, and cut with a wine-glass. You may beat the other white, and wash over them; and either dust sugar, or not, as you like.

3. Mix two cups of cream, three cups of sugar, five eggs, the whites beaten to a stiff froth, one tea-spoonful of soda, flour to make about as stiff as pound cake. Salt, brandy, spice, or other flavor, to the taste.

Wedding-Cake.—Four pounds of flour, three pounds of sugar, two pounds of currants, three pounds of raisins, twenty-four eggs, one ounce of mace, three nutmegs. This will keep two or three years.

Wine-Cake.—Beat two eggs and mix them with eight ounces of butter which has been beaten to a cream. Mix together six ounces of powdered lump sugar, fourteen ounces of finely-sifted flour, half a grated nutmeg, a tea-spoonful of ground ginger, and a table-spoonful of caraway-seed. When well mixed, work this well into the butter and eggs, beat it half an hour, and then add a large wine-glass of sherry or other good wine. Bake it in tin patty-pans, in a moderately-quick oven.

Soups.—All soups are better to be made with fresh, uncooked meat, and not from meat once cooked, from which has been extracted most of its flavor and juices—leaving your cold meats for spicing or hashing. Of whatever meat soup is to be prepared, it should be carefully washed, not soaked, and then placed in water quite cold, bringing this, very slowly, to a scald. If boiled at all, it should only be after a long simmering. This will bring out all the natural juice of the meat, so that when ready for the seasoning, and such vegetables as you choose to add, the scraps of meat may all be skimmed out without loss. Vegetable seasonings, such as summer savory, parsley, celery, thyme, sage, onions, garlic, and other seasoners should not be put into soups or stews until the soup is nearly done; chop fine and put in five minutes before the soup is taken from the fire.

Beef Soups.—Get a good beef soup bone, boil two hours, leaving about two quarts of broth; break two eggs into some flour, and knead it very stiff; roll out in three sheets to the thick-

ness of wrapping-paper; spread them on the table to dry half an hour; then place them on one another, and roll them up as you would jelly-cake; with a sharp knife cut very fine strips from the end, not wider than the thickness of a case-knife; shake them up to separate them; drop them into your broth slowly, stirring your soup all the while. Boil ten minutes; season with pepper, salt, celery, summer savory, or a little parsley.

Baked Soup.—Take one pound of lean beef, chop rather fine, place in an earthen pot which will hold five quarts of liquid. Slice and add two onions, two carrots, two table-spoonsful of rice well washed, a pint of whole or split peas, a tea-spoonful of black pepper, and a table-spoonful of salt; pour over all one gallon of cold water; put the lid of the jar on it, or a close-fitting plate, and bake four hours. This is a nice, wholesome dish.

Chicken Soup.—Cut up a nicely-dressed chicken; put it in the pot with water to cover it, which must be measured, and half as much more added to it before the soup is dished. Keep it covered tight, boiling slowly, and take off the fat as fast as it rises. When the chicken is tender, take it from the pot and mince it very fine; season it to the taste, and brown it with butter in a dripping pan. When brown, put it back in the pot. Brown together butter and flour, and make rich gravy by adding a pint of the soup; stir this in the soup, and season it with a little pepper, salt, and butter. Be careful the chopped chicken does not settle, and burn on the pot. It will be well to turn a small plate on the bottom of the kettle to prevent this. Toast bread quite brown and dry, but do not burn it, and lay the toast in the tureen, and serve it with the soup; stir the chicken through it, and pour it in the tureen.

Mock Turtle Soup.—Scald a calf's head, and wash it clean. Boil it in a large pot of water for half an hour, then cut all the skin off by itself; take the tongue out, take the broth made of a knuckle of veal, put in the tongue and skin, with an onion, one-half ounce each of cloves and mace, half a nutmeg, all kinds of sweet herbs chopped fine, three anchovies; stew it till tender; then take out the meat, and cut it in pieces two inches square; cut the tongue, previously skinned, in slices; strain the liquor through a sieve. Melt one-half pound of butter in a stew-pan; put in it one-half pound of flour; stir it till smooth; if at all lumpy, strain it; add the liquor, stirring it all the time; then put to the meat the juice of two lemons, and

one bottle of Madeira wine, if you choose. Season with pepper, salt, and cayenne pepper, pretty high; put in five meat balls, eight eggs, boiled hard. Stew it one hour, gently.

Clam Soup.—Twenty-five large clams, opened raw, drained from the liquor, and chopped fine; three quarts of water with the liquor of the clams, just come to a boil; then add a pint of milk, thickened with four table-spoonsful of flour and four of butter, rubbed together. After it is removed from the fire add three well-beaten eggs, and stir well.

Vegetable Soup.—Take a shin of beef, six large carrots, six large yellow onions, twelve turnips, six tomatoes, one pound of rice or barley; parsley, leeks, summer savory; put all into a soup-kettle, and let it boil four hours; add pepper and salt to taste; serve altogether. It makes a good family soup.

Corn Soup.—Boil twelve ears of corn—which should be young and tender—in four quarts of water. Take the liquor in which they are boiled, and put in a knuckle of veal or piece of "soup beef." If no grater is to be had, use a sharp knife to cut down each row of corn. Then with a spoon scrape off all the corn, leaving the hulls on the cobs. Put the cobs back into the liquor to boil with the meat three or four hours. Strain all through a sieve, set it aside to cool, and skim off the fat. Mix four table-spoonsful of flour with a quarter of a pound of butter. Put the liquor into the pot, add the flour and butter and corn. Season with pepper and salt. Boil half an hour and serve. If a stock is on hand use it, in proportion to its strength, with the clear water. This should make two and a half quarts of soup. The knuckle of veal or beef can be again boiled for second stock.

Bean Soup.—Wash a quart of common white beans, or turtle-soup beans, and put them into a bowl and cover with water—soak over night. The next morning put four quarts of water into a pot, turn in the beans, with three or four onions, a couple of carrots, and a table-spoonful of celery-seed tied in a muslin bag. If black beans are used, stick three cloves in each onion; put it on to boil slowly for four hours. Then pour the soup on a sieve, and rub all thoroughly through it. Put on the soup again, that it may heat and boil down if too thin; or if too thick, add hot water. Season with pepper and salt. A half a pound or a pound of salt pork may be cooked with the beans. Have some slices of bread toasted, cut in small pieces and put in the tureen, and turn on the hot soup. If the black

beans are used, *small bits* of sliced lemon are a great improvement.

A richer soup may be made by boiling a shin of beef the day before, and taking off *all* the fat after straining and cooling; or any bones suitable for soup can be used. This receipt will make three quarts of superior soup.

German Pancake Soup.—Make a batter with a pound of flour, a little salt, half a pint of milk; stir well, and add two eggs beaten; it should be of the consistency of cream. Make this into pancakes fried very pale-yellow. As each one is fried, lay it on a board and double over once. Roll each slightly, and cut into strips half an inch wide, and put them into the soup tureen, and pour good stock well seasoned and strained over them. Serve hot.

Beer Soup.—White beer (or wheat beer) is best for this. First boil the beer, and then beat up four eggs with a few spoonful of flour in a little cold beer; throw this into the boiling beer; take it from the fire, put butter, salt, and sugar in it, and fill it with crisp stale rolls cut in dice; dust the whole with cinnamon.

Selecting Meats.—In purchasing meat by the quarter or in less quantities, select such pieces as have the smallest, thinnest, and flattest bones, covered by fine-grained flesh with fat intermixed in thin streaks or layers with the lean. Such pieces will be found tender, juicy, and most profitable.

A piece of roast beef, in the process of cooking, loses fifteen per cent.; if boiled, it loses only eleven per cent. If a leg of mutton is roasted, it loses twenty-five per cent.; but only ten per cent. if boiled. There is, therefore, less loss in a beef than a mutton roast, but mutton, however, is four per cent. more nutritious than beef.

Freshening Meats and Fish.—To freshen salt meat or fish, put it in water and let it simmer, not boil, awhile over the fire. The water should be changed two or three times before it is sufficiently freshened for cooking.

Roasting Beef.—It should be exposed to a quick fire, that the external surface may be made to contract at once, and the albumen to coagulate before the juice has had time to escape from within. And so in boiling. When a piece of beef or mutton is plunged into boiling water, the outer part contracts, the albumen which is near the surface coagulates, and the internal juice is prevented either from escaping into the water by which it is surrounded, or from being diluted or weakened by the admission of water among it. When cut up, therefore, the

meat yields much gravy, and is rich in flavor. Hence, a beefsteak or a mutton chop is done quickly, and over a quick fire, that the natural juices may be retained. On the other hand, if the meat be exposed to a slow fire, its pores remain open, the juice continues to flow from within, as it has dried from the surface, and the flesh pines and becomes dry, hard, and unsavory. Or, if it be put into cold or tepid water, which is afterward gradually brought to a boil, much of the albumen is extracted before it coagulates, the natural juices for the most part flow out, and the meat is served in a nearly tasteless state.

The Roasting Spit.—The spit used in roasting meat ought to be kept very clean, and should be rubbed with nothing but sand and water, and wiped dry with a cloth. Oil, brickdust, etc., will injure the meat.

Rendering Tough Meats Tender.—Tough cheap pieces of beef can be made tender and palatable by being put into the pot with a trifle more water than will be finally needed. Set into the top of the cooking pot a closely-fitting tin pan or pail, and fill it with cold water. If this gets boiling hot, dip out some and add cold water from time to time. Boil the meat until it gets so entirely tender that the bones will drop out, even if it takes five or ten hours. The steam and aroma or flavor of the meat will be condensed on the bottom of the covering pan or pail of water, and drop back, and thus be retained. When thoroughly done, remove the cover and slowly simmer down thick enough to jelly when cold. Dip out the meat, remove the bones, place it in a pan, pour over it the boiled liquid, lay over it a large plate or inverted tin platter, and put on fifteen or twenty pounds weight. When cold, it will cut into nice slices, and if lean and fat or white meat be mixed, it will be beautifully marbled. The juice will jelly and compact it firmly together, and you will have nice juicy meat, good for breakfast, dinner, or supper, and so tender that poor teeth can masticate it. Fresh beef, or corned beef well freshened in cold water, may be used in this way with decided economy, and it is far superior to meat boiled in an open vessel from which the flavor has constantly escaped, as you can perceive by the odor all through the house.

To render pork and veal wholesome, says Professor BLOT, they should always be baked till overdone.

Place a paper greased with butter over meats that are being baked.

Braising Meats.—Use an old-fashioned bake-pan or bake-kettle—if by an old-fashioned fire, with a cover arranged to hold live coals. Meats cooked slowly, and for a long time, in a braising or bake-pan, with the steam confined around them, have a richness of flavor not otherwise obtained. The meat should be browned, and water enough added from time to time to prevent burning, and form a rich gravy with the juice of the meat. Veal, usually so badly cooked, becomes, when treated in this way, a delicious morsel; and so of a thick slice of ham cooked long and slowly.

Potpie Crust.—Beat up one egg and mix it with a tea-cupful of new sweet milk, and a tea-spoonful each of saleratus and salt; then mix half a tea-spoonful of cream of tartar in dry flour, of which latter add till the crust is as soft or softer than ordinary soda biscuit; then put the crust in the pot, with the water and meat already boiling, with a plenty of water to cover both crust and meat, and a tight cover to keep the steam in the pot, and boil three-quarters of an hour.

Gravies.—*Drawn Butter.*—Work a heap- ing tea-spoonful of flour and two ounces of sweet butter together, and then add two tea-spoonsful of sweet milk; put it in a sauce-pan on a slow fire, when melted, add a table-spoonful of milk mixed in six of water—let it simmer awhile till it begins to thicken, and when it gently boils it is done. Celery, spices, catsups, or essences may be added, if desired. This is a proper sauce for boiled fish, mutton, lamb, turkeys, and game of all kinds; but not for roasts.

Gravy for Roast Beef.—Take the drippings and water in which the beef was basted, pouring off most of the water with the oil, and thicken it over the fire with a trifle of flour. Wine may be added.

Gravy for Roast Mutton, Lamb, Venison, etc.—Stew some mutton, cut fine, in as little water as will cover it, for an hour; drain off the liquor, season with pepper and salt, and thicken with a little butter and flour rubbed together.

Gravy for Steaks.—For two slices of steak, put on a platter butter the size of an egg, cut in small pieces, with a little salt, a dust of pepper, and two table-spoonsful of hot water; do not boil, but simply melt and keep warm.

An excellent gravy may be made with steaks by adding a little cream, thickened with a pinch of flour, into which, when off the fire and partly cooled, stir the well beaten yolk of an egg.

Tomato Sauce for Steak.—Cut ten tomatoes into quarters, and put them into a sauce-pan with four onions sliced, a little parsley, thyme, one clove, and a quarter of a pound of butter, set the sauce-pan on the fire, stirring occasionally for three-quarters of an hour; strain the sauce through a hair sieve, and serve with steak.

Gravy for Game.—Boil the hearts, livers, gizzards, and lights in the stock of beef or veal soup; when done chop fine, and season with butter, pepper, and salt, and thicken with the yolk of an egg.

Wine Sauce for Venison.—One gill each of mutton broth and port or other wine, one table-spoonful of currant jelly; heat them nearly boiling hot, and thicken with the yolk of an egg.

Sour Sauce for Venison.—Brown, not burn a coffee-cup of sugar in an iron kettle; take it out and dissolve it in half a pint of strong vinegar; heat it, and add a gill of cranberry juice or jelly, and serve hot.

Gooseberry Sauce for Boiled Lamb.—Stir half a pint of gooseberries, after they have been scalded, into a pint of drawn butter, and serve hot.

Sauce for all Kinds of Fresh Fish.—Half a pint each of wine and rich gravy, a little nutmeg, two table-spoonsful of catsup, salt; simmer well together, and add three ounces of butter thickened with flour, arrow root or corn starch; and when it boils, it will be still further improved by the addition of some scraped horse-radish and a dozen or two of oysters.

Egg Sauce for Salt Fish.—Three hard boiled eggs to half a pint of thin drawn butter—using all the yolks, but only half of the whites, chopped fine and mix well.

Spice for Chops and Gravy.—Three drams each of ginger, black pepper, and cinnamon, an ounce and a quarter of white pepper, one ounce grated nutmeg, half an ounce mace, one-fourth ounce cayenne pepper, and seven cloves; mix well, bottle and keep dry.

Stuffing.—In stuffing, care should be taken to leave room for swelling, or it is apt to be hard and heavy.

Stuffing for Roast Pork, Ducks, Turkeys, or Geese.—Two-thirds onion, one-third green sage chopped fine, bread crumbs equal in weight to the sage and onions; season with a little pepper and salt, and incorporate it well with the yolk of an egg or two, and a bit of butter. Some omit the bread crumbs; some again, omit

the onions; while others add to them a clove of garlic.

Stuffing for a Pig.—A large tea-cupful of grated bread, two ounces of butter, seasoning with nutmeg, salt, and pepper; scald two small onions, chop fine, and about thirty leaves of young sage, and an egg beat fine, and mix all together, stuff, and sew up.

Stuffing for Roast Fowls.—A good stuffing for baked or roast chicken may be made by chopping an onion fine, and stirring it with two ounces of butter in a sauce-pan on the fire. It is taken off a moment, and bread which has been soaked in water and the water squeezed out is added with salt, pepper, a little nutmeg, and some parsley chopped fine. Then one yolk of an egg, mixed in thoroughly on the fire for half a minute. This stuffing is then inserted in the chicken.

Another.—Spread pieces of stale, but tender wheaten bread liberally with butter, and season rather high with salt, pepper, and summer savory, working them into the butter; then dip the bread in wine, and use it in as large pieces as is convenient to stuff the bird. The delicious flavor which the wine gives is very penetrating, and it gives the fowl a rich, gamey character, which is very pleasant.

Beef.—*Beefsteak.*—The rules adopted by the celebrated "Beefsteak Club," organized in England, in 1734, were thus represented:

"Pound well your meat until the fibers break;
Be sure that next you have, to broil the steak,
Good coal in plenty; nor a moment leave,
But turn it over this way and then that,
The lean should be quite rare—not so the fat;
The platter, now and then, the juice receive,
Put on your butter—place it on your meat—
Salt, pepper; turn it over, serve, and eat."

Take a nice cut of sirloin or porter-house steak—or a steak from the seventh and eighth ribs, an inch and a quarter or an inch and a half thick—rub in salt and pepper well with the hands, and grease both sides slightly with sweet lard or fresh butter—using no strong or rancid butter. Place it between the bars of a well-warmed gridiron, so that it can be easily turned over the fire, which should be one of hot living coals; and there should be no smoke from dripping gravy, which can be easily avoided with proper care. Turn it frequently till done, for much of the deliciousness of a good steak depends upon its frequent turning; and, when done, place it upon a hot dish, sprinkle over it a little more salt and pepper, spread over it a little sweet butter, and let it be served and eaten immediately. A delay of even five minutes makes an immense difference in the flavor. The meat should be cooked entirely through, and the interior should be of a uniform red color—never dark and raw; thus it is rendered exceedingly digestible, and very beneficial to convalescing patients.

Another mode of broiling a beefsteak is as follows: The frying-pan being wiped dry, place it upon the stove and let it become hot. In the meantime mangle the steak—if it chance to be sirloin, so much the better—pepper and salt it, then lay it on the hot, dry pan, which instantly cover as tight as possible. When the raw flesh touches the heated pan, of course it seethes and adheres to it, but in a few seconds it becomes loosened and juicy; every half minute turn the steak, being careful to keep it as much as possible under cover. When nearly done, lay a small piece of butter upon it, and, if you want much gravy, add a table-spoonful of strong coffee. In three minutes from the time the steak first goes into the pan it is ready for the table. This makes the most delicious, delicately-broiled steak, full of juice yet retaining the healthy, beefy flavor, that any John Bull could require. The same method may be applied to mutton-chops, only they require more cooking to prevent them from being rare.

Beefsteak for the Old.—Take coarse, lean beef, with a small quantity of suet; run it through a sausage-cutter, or chop it very finely; add pepper and salt; make into cakes three-quarters of an inch thick, and cook as you would beefsteak.

Stuffed Beefsteak.—Prepare a dressing of bread scalded soft, and mixed with plenty of butter, a little pepper, salt, sage, a little onion, and an egg. Lay it upon one-half of a round of steak, cover with the other half, and taste it down with needle and thread. Salt and pepper the other side of the steak, and place it in a dripping-pan with half an inch of water. When baked brown on one side, turn and bake the other, watching closely that it does not burn.

Roast Beef.—When the meat is put on the fire, a little salt should be sprinkled on it, and the bony side turned toward the fire first. When the bones get well heated through, turn the meat, and keep a brisk fire—baste it frequently while roasting. There should be a little water put into the dripping-pan when the meat is put down to roast. If it is a thick piece, allow fifteen minutes to each pound to roast it in; if thin, less time will be required. The tenderloin, and first and second cuts of the rack, are the best as roasting pieces. The third and fourth cuts are good.

Beef Alomode.—Take a thick piece of flank, or, if most convenient, the thickest part of the round, weighing eight or ten pounds. Cut off the strips of coarse fat upon the edge, make incisions in all parts, and fill them with a stuffing made of bread, salt pork chopped, pepper, and sweet marjoram. Push whole cloves here and there into the meat; roll it up, and fasten it with skewers, and wind a strong twine or tape about it. Have ready a pot in which you have fried to a crisp three or four slices of salt pork; take out the pork, lay in the beef, and brown every side. When well browned, add hardly water enough to cover it, chop a large onion fine, and eighteen or twenty cloves, and boil gently, but steadily, four hours. The water should boil away, so as to make a rich gravy, if it needs to be thickened.

Stewed Beef.—Cheap pieces of beef can be stewed so as to make a capital dish. Wipe all the blood from the meat, salt and pepper it well, cover it in the pot with water; boil from two to three hours till thoroughly tender; add half an onion, a sprinkle of sage, thyme, or summer savory. If the meat is fat, let the water all stew out half an hour before the meat is put on the table, and, when it is well browned on one side in the gravy, turn it over and brown the other.

Spiced Beef.—Take a piece of meat from the fore quarter, weighing ten pounds. Those who like fat should select a fatty piece; those who prefer lean may take the shoulder clod or upper part of the fore leg. Take one pint of salt, one tea-cup of molasses or brown sugar, one table-spoon ground cloves, allspice, and pepper, and two table-spoons pulverized saltpeter. Place the beef in a deep pan; rub with this mixture. Turn and rub each side twice a day for a week. Then wash off the spices; put in a pot of boiling water, and, as often as it boils hard, turn in a tea-cup of cold water. It must simmer for five hours, on the back part of the stove. When cold, press under heavy weights, and you will never desire to buy corned beef of the butcher again. Your pickle will do for another ten pounds of beef, first rubbing into it a handful of salt. It can be renewed, and a piece kept constantly in preparation. This is a good pickle for tongues fresh from the market.

Rolled-up Beef.—Cut pieces of beef, about as broad as a hand, and three-eighths of an inch thick, pound well, and add pepper and salt. Cut slices of bacon of the same size as the beef, roll the slices together, and tie them with a string. Boil with water enough to cover the meat;

keep in a pot well closed. When the beef is tender, take it out, and also half the liquor; let the other half boil down, and then add the first half to it. Season with onions and salt to taste. Cut the strings off the meat and put on the table with the gravy. If to be used on the second day, boil it up again, cutting a pickle in the sauce, and it will be just as good. If to be kept for a time, put it in a dish and cover with fat. It will keep good for several weeks.

Pressed Beef.—Salt a piece of the thin part of the flanks, the tops of the ribs, or a piece of the brisket, with salt and saltpeter, for five days. Boil until very tender; then place between two boards, with a heavy weight upon the top one, and let it remain until cold. Serve it as it is, and garnish it with parsley.

To Mince Beef.—Shred the underdone part fine, with some of the fat; put it into a small stew-pan, with a little onion, a little water, pepper, and salt; boil it till the onion is quite soft; then put some of the gravy of the meat to it, and the mince; but do not let it boil again. Have a small hot dish with bits of bread ready, and pour the mince into it, but first mix a large spoonful of vinegar with it.

Beef Cakes.—Pound some beef that is underdone with a little fat bacon, or ham; season with pepper, salt, and a little onion; mix them well; and make into small cakes three inches long, and half as wide and thick; fry them a little brown, and serve them in a good thick gravy.

Beef Patties.—Shred underdone dressed beef with a little fat; season with pepper, salt, and a little onion. Make a plain paste; roll it thin and cut it in shape like an apple-puff; fill it with the mince, pinch the edges, and fry them of a nice brown. The paste should be made with a small quantity of butter, egg, and milk.

Beef Pie.—Take cold roast beef or steak, cut it into thin slices, and put a layer into a pie-dish. Shake in a little flour, pepper, and salt; cut up a tomato (if in the season) or onion, chopped fine; then another layer of beef and seasoning, and so on until the dish is filled. If you have any beef gravy, put it in; if not, a little beef drippings, and water enough to make sufficient gravy. Have ready one dozen potatoes well boiled and mashed, half a cup of milk or cream, and a little butter and salt. Spread it over the pie as a crust, an inch thick, brush it over with egg, and bake about twenty-five minutes.

Cooking Tripe.—Clean it well; let it lie for several days in salt and water. Wash it well

before cooking, then roll it, tie with twine, put it into cold water, and boil slowly for three hours, skimming it frequently. Then peel and cut into halves half a dozen white onions, lay them in a pan of cold water for half an hour, to extract the strong taste; then put them into fresh cold water, and boil for half an hour, with a little salt. Throw off the water, and cover them with new milk, and let them simmer for fifteen minutes, mash them well; then rub a large spoonful each of butter and flour together; stir this into the milk and onion, and let it simmer and mix together. Rub through a sieve, and add a cupful of cream or milk. Serve this hot with the tripe, which should be cut into slices before sending it to the table, keeping it rolled in cutting.

Mutton.—*Steaks Maintenon.*—Half fry; stew them while hot, with herbs, crumbs, and seasoning; put them in paper immediately, and finish on the gridiron. Be careful the paper does not catch; rub a bit of butter on it first to prevent that.

Mutton Chops.—Cut the pieces from the loin or the best part of the neck; take off most of the fat. Dip them in a beaten egg, or not, as you prefer, strew over them some crumbs of cracker or bread, sprinkle them with salt or cut parsley, and fry them in a very little butter. Two or three slices of salt pork or a little lard may be substituted for butter. When the chops are done, lay them in a hot dish; pour a tea-cupful of hot water into the frying-pan, dredge in a little flour, and as it boils up stir it thoroughly, then pour it over the chops.

Mutton chops are very good broiled; and steaks cut from a good leg which has been kept several days, are as fine as any meat can be for this purpose.

Ragout of Mutton.—Put in the pot a quarter of a pound of dripping; when hot, peel and cut twenty small turnips, or ten large ones, into pieces the size of a walnut; put them into the fat and fry until brownish. Take them out; then put into the fat a quarter of a pound of flour; stir round until brown. You have prepared four pounds of scrag of mutton, cut in small pieces; put them in, and stir round; then add enough water to cover the meat; stir until boiling. When the mutton is nearly done, which you will find by trying it with a fork, add the turnips; season with three tea-spoonfuls of salt, one of pepper, the same of brown sugar, and a little bit of scraped garlic,

if handy. Any part of mutton may be used. Ragout of veal or lamb may be done in this manner.

Lamb and Rice.—Half roast a neck of lamb, take it up and cut into steaks; take half a pound of rice boiled ten minutes in a quart of water, put it into a quart of good gravy, with two or three blades of mace, and a little nutmeg; do it over a stove or fire till the rice begins to be thick; then take it off and stir in half a pound of butter, and when that is quite melted, stir in the yolk of six eggs well beaten, then take a dish and butter it all over them, dip them into melted butter, lay them into a dish, pour the gravy that comes off them and then the rice; beat the yolks of three eggs and pour all over, send it to the oven and bake it better than half an hour.

Hashed Mutton and Fried Eggs.—Cut the cold mutton into neat slices, cutting off the brown outside and fat; warm the meat in the sauce, and add some tomato sauce to the gravy; then put round the dish some sippets of bread and fried eggs.

Haricot.—This dish, simple as it is good, is made by stewing the breast of mutton and potatoes together.

Pork.—"Swine's flesh," says the *Journal of Physical Culture*, "is the worst of meats. God told the Jews not to touch pork, because He knew pork was bad for them. And I echo the voice of my profession from almost every civilized country when I say that this immense use of the flesh of the swine is filling all Christendom with salt-rheum, erysipelas, scrofula, and other vile humors. And all this is more emphatically true when the animal is fattened in a close pen, without exercise, and stuffed with every conceivable kind of filthy food." Yet, as pork is largely used as an article of food, it is proper to give some of the best modes of its preparation.

Pork Chops.—Cut the chops about half an inch thick; trim them neatly, put a frying-pan on the fire, with a bit of butter; as soon as it is hot, put in your chops, turning them often till brown all over; they will be done enough in about fifteen minutes. Season with a little finely-minced onion, powdered sage, pepper, and salt. A little powdered sage alone will give them a nice relish.

Pork Cutlets.—Cut fat salt pork into slices; parboil it; fry it; then add a batter made of eggs, milk, and flour. Cook in such a way that

the pork will be encased in the batter when done. It is superior to the old-fashioned farmers' dish of fried pork and eggs,

Roast Pork.—Lay it at some distance from the fire, and flour it well. When the flour dries, wipe the pork clean with a coarse cloth; then cut the skin in rows with a sharp knife, put your meat close to the fire, and roast it as quick as possible. Baste with butter and a little dry sage. Some persons add onions finely shred, and sage.

Roast Pig.—To have it in prime order it should be from four to five weeks old, not older, and should be killed and dressed the day before roasting. Make a stuffing of bread crumbs, dry, and two or three good-sized onions chopped fine, and about two table-spoonful of finely powdered sage, well seasoned with salt and pepper. Allow no water in the pan, bake whole in a good oven, and rub often with a little bag of butter. When done, the fat should all be poured from the pan, a little water added to the brown gravy, boiled up, and either poured over the pig or served in a tureen. It should be served with hot plates, apple sauce, hot, and very nice onion sauce.

Baked Pork.—Any part, not too fat, is exceedingly good done in this way: Cut two pounds in slices, rather large and thin, season with salt and pepper, then add a few slices of fat, then some slices of potatoes, then pork, and then potatoes, until all is in; add half a pint of water. Bake one hour and a half.

Pork Pie.—Cut the pork in thick pieces, peel two baking apples, four onions, and eight potatoes, cut them in slices, season with pepper and salt, and if liked, a little powdered sage; intermix the vegetables, lay the slices and the vegetables together, half a pint of water, or enough to cover it. Bake two hours and serve.

Tomato Ham.—Cut a slice of ham, with but little of the fat, an inch thick across the middle; peel and slice eight or ten red tomatoes and an onion, put them in a small stew-pan, cover close, and cook three-quarters of an hour; season with pepper.

To Broil Ham.—Ham is better broiled than fried. Slice it thin, and broil the slices on a gridiron; when dished, place a fried egg on each slice and serve out. It should be broiled over bright, hot coals, from five to eight minutes, turning it once.

To Boil Hams.—If it be a Maryland or Virginia ham, or any one rather old or hard, it should be soaked over night in plenty of water, then put into a suitable cooking pot of cold

water, which should be raised to a gentle boil, or rather simmer, and this should be continued for fifteen minutes for every pound weight of the ham. Then take out, remove the skin, and dust over it plentifully of bread crumbs, and set in the oven to bake from fifteen or thirty minutes. This very much improves the meat, for much of the fat fries out, and it becomes much more tender and healthy.

Baked Hams.—Under the head of braising meats, we have spoken of that delicious mode of cooking hams. Hams are said to be much better baked, if baked right, than boiled. Soak the ham for an hour in clean water, and wipe it dry; next spread it all over with thin batter, and then put into a deep dish, with sticks under it to keep it out of the gravy. When it is fully done, take off the skin and batter crusted upon the flesh side, and set it away to cool. You will find it very delicious, but too rich for dyspeptics.

Veal.—*Outlets.*—Cut steaks from a leg of veal; rub them with salt and a little pepper; dip them first in one or two beaten eggs, and then in rolled cracker crumbs, or grated bread crumbs, and fry in lard or with slices of pork.

Brown Ragout of Veal.—Take two pounds of the breast, cut it into rather small pieces, about the size of an egg, roll them well in flour, put some fat in the frying pan, fry the meat until a nice brown, take it out, then fry four onions, two turnips cut in large slices, and one carrot the same. When brown, take them out, put the veal and vegetables into a pan, season with two tea-spoonful of salt and one of pepper, add a pint of water, put into the oven for one hour, skim the fat, shake the pan, and serve. A few herbs and a little ham or bacon is an improvement. Beef, mutton, lamb, and pork may be done in the same way. A tea-spoonful of sugar is an improvement.

Veal Omelet.—Take four pounds of lean veal, and one and a half of fat salt pork; chop them very fine, or run them through a sausage cutter; add one table-spoonful of salt, one of black pepper, two of sage or summer savory, four table-spoonful of bread crumbs or pulverized crackers, four eggs, and two gills of sweet cream; mix eggs, cream, and bread or crackers together; then add the other ingredients; bake in a deep pan three to four hours; put on the top small bits of butter before cooking; when done turn it out on a platter, and cut it in slices as you would head-cheese. It will keep for several days.

Stewed Veal.—Cut your meat in pieces, wash them clean, put them into the dinner pot, add three pints of water, put in one onion, some pepper and salt, let it stew one hour; then add potatoes sliced, and make a crust of sour milk or cream of tartar, and put in and stew till the potatoes are done, about half an hour; the crust may be made into biscuits. Crumbs of any kind of fresh meat may be used in making a stew.

Veal Potpie.—Take a scrag or breast-neck of veal; cut it into slices about an inch thick; fry some slices of salt pork in an iron pot; flour the veal; lay them into the hot fat, and let it brown a little; add water enough to just cover the meat; let it simmer about half an hour; season it with pepper and salt; dredge in a little flour. Have ready a common paste, roll it about half an inch thick, just large enough to cover the meat; cover the pot with a hot iron cover. Let it cook gently about three-quarters of an hour.

Or, instead of boiling a crust with the gravy, make some cream biscuit, bake brown, pull them open, and drop them into the boiling gravy, leaving them in a few moments.

Stuffed Leg of Veal.—Take out the bone; rub the meat well with salt and a little pepper; sew up one side, and fill the center with a stuffing made of soaked bread, a heaping spoonful of lard or butter, four ounces of chopped suet, three chopped boiled eggs, a little salt, pepper, summer savory, and a beaten egg to bind it; fill the spaces in the meat; sew a piece of white cloth over the top, and put it in the oven in a baking pan with some cold water. Frequently dip up the water and pour over the meat until it is thoroughly cooked. Then thicken the gravy with a little flour. It is good hot or cold.

Potted Veal.—Pound cold veal in a mortar, work up with it in a powder, mace, pepper, and salt; shred the leanest part of tongue very finely, or ham is sometimes used; place in a jar or pot a layer of the pounded veal, and upon that a layer of the tongue, and continue alternately until the pot is full, seeing that every layer is well pressed down; pour over the top melted clarified butter. If it is desired, and which is frequently done, to marble the veal, cut the tongue or ham in square dice instead of shredding it, but care must be taken that they do not touch each other or the effect is destroyed.

Veal Cake.—Take away the brown outside of cold roast veal and cut the white meat into thin slices; have also a few thin slices of cold ham,

and two hard boiled eggs, which also slice, and two dessert spoonsful of finely-chopped parsley. Take an earthenware mold and lay veal, ham, eggs, and parsley in alternate layers, with a little pepper and a sprinkling of lemon on the veal. When the mold seems full fill up with strong stock and bake for half an hour. Turn out when cold and garnish with sprigs of parsley.

Breakfast Balls.—A little cold mutton or beef, or both, a slice of cold ham, a small quantity of fine bread crumbs, a bit of sage, parsley, or thyme; chop well together; add an egg, a little melted butter, pepper, and salt. Take a table-spoonful of this mixture, dredge it well with flour, drop it into hot lard and fry brown; it is very nice.

Poultry.—*Preparing Fowls for Cooking.*—Professor BLOT, in one of his lectures on cooking, gave the following excellent directions for preparing fowls: Never wash meats or fowls. Wipe them dry if you choose, and if there is anything unacceptable, it can be sliced off thinly. In cooking a chicken whole, no washing is to be done, except the gull bladder be broken, when it is best to cut the chicken up and wash it thoroughly. And again, in cleansing chickens never cut the breast; make a slit down the back of the neck, and take out the crop that way. Then cut the neck bone close, and after the bird is stuffed the skin of the neck can be turned up over the back, sewed down, and the crop will look full and round. Further, the breast bone should be struck smartly with the back of a heavy knife, and with a rolling-pin to break it. This will make the chicken lie rounder and fuller after it is stuffed. The legs and wings should also be fastened with thread close to the side, running a long needle through the body for that purpose.

Broiling Fowls.—A good bed of coals, and a good gridiron, several inches from the coals, are quite essential. Put the meat on the gridiron, the cut side down, cook slowly, frequently taking it off, and dipping the side broiled in butter, pepper, and salt. It should be cooked fully half an hour, with an inverted pan covering the gridiron.

Roasting a Turkey.—Having filled the turkey with dressing, sew up the opening, truss it nicely, oil it with butter, put it before a moderately-hot bright fire or in an oven, heating the skin as evenly as possible, and covering it with paper if there is the least danger of browning too soon. Roast pretty fast the first half hour without scorching, and baste the

fowl every five minutes; then let it roast steadily—rather slowly—for two hours, or two and a half, for a good-sized tender turkey, when it will be done quite through. If the fluid which follows the sticking of a fork through the breast and thighs is entirely free from blood, it is done. If not sufficiently browned, replenish the fire, wet the fowl with a very little yolk of egg, dust it lightly with flour, and let it brown evenly all over.

Boned Turkey.—Boil a turkey in as little water as may be, until the bones can be easily separated from the meat. Remove all the skin; cut the meat in thin slices, mixing together the light and dark parts. Season with salt and pepper. Take the liquid in which the turkey was boiled, having kept it warm, pour it on the meat, and mix it well. Shape it like a loaf of bread, wrap it in cloth, and press with a heavy weight for a few hours. When served up it is cut in thin slices. Some of our professional cooks can shape it somewhat like the original bird, so that one can not tell at once when it is seen that it is boned turkey; but this requires skill and labor. It is a favorite cold relish at evening parties.

To Roast Geese and Ducks.—Boiling water should be poured all over and inside of a goose or duck before you prepare it for cooking, to take out the strong oily taste. Let the fowl be picked clean, and wiped dry with a cloth inside and out; then fill the body and crop with stuffing. If preferred to stuffing, fill with onions; put it before the fire, and roast it brown—requiring about two hours and a half.

When a goose is less than a year old it can be cooked so as to taste almost as well as a turkey. When the fowl is nearly ready to be killed, put vinegar into its food, and the day before its neck is brought to the block, pour a spoonful of vinegar down its throat. It has the effect—the reason of which is not well understood—of making the flesh tender. Boil slowly for about two hours, if the goose is old, taking care to skim away the oil. One hour for a young goose. Then stuff, and roast, or bake, like a turkey, using a little good vinegar with the basting.

Minceed Fowl.—Take the remains of a cold roast fowl and cut off the white meat, which mince finely without any skin or bone; but put the bone, skin, and etceteras into a stew-pan with an onion, a blade of mace, and a handful of sweet herbs tied up, and nearly a pint of water; let it stew for an hour, and then strain and pour off the gravy.

Cooking Old Fowls.—Cut up in pieces, season to taste, with a little water in the dish; cover tight, set in a moderate oven after breakfast, and when you take it out for dinner, you will find the meat tender and very nutritious.

Fricassee Chicken.—Joint, wash, and lay them in the stew-pan with pepper and salt on each piece, and water scarcely to cover them; stew them half an hour, take them up, thicken the gravy with flour and a table-spoonful of butter. If convenient, add a gill of cream, let it boil up a minute, return the chicken to the stew-pan, and boil five or six minutes more, then serve them.

Chicken Pie.—Take two common-sized chickens, put them in the pot with plenty of water, some salt, and boil until tender, but not too much. Then make a crust, as you would for biscuit—cream is best for mixing it. Roll about one-fourth inch thick, and line the sides of a six-quart pan with the crust, then dip in a layer of chicken, season with butter, pepper, and salt to suit the taste. Then another layer of crust, and again a layer of chicken, and so on until the pan is full. Then roll a top crust large enough to cover the pan, put into the oven, bake moderately one hour and a half. Make holes in the top crust to let out the poisonous gases.

Rice Chicken Pie.—Cover the bottom of a pudding-dish with slices of broiled ham; cut up a broiled chicken and nearly fill the dish; pour in gravy or melted butter to fill the dish; add chopped onions, if you like, or a little curry-powder, which is better; then add boiled rice to fill all interstices and to cover the top thick. Bake it for one-half or three-quarters of an hour.

Green sweet corn also makes a good addition to chicken pie.

Chicken Croquettes.—Chop up cold chicken; one onion chopped fine to every half pound of meat—the onion to be fried with a table-spoonful of butter; but before the onion is quite fried, add a table-spoonful of flour—stir; then add some broth made from the chicken bones—stir again; add a gill and a half of broth, salt; then the meat is put in—stir again, and put on a slow fire. Three small mushrooms, or tomatoes chopped fine, are then added to the meat, a little nutmeg grated, a little pepper; keep on the fire a little while, so as to finish the onions, and mix thoroughly about ten minutes; then remove from the fire and stir in two yolks of eggs; then put back on the fire, give one boil and pour into dish;

spread and let it cool; then work a little with the hands to soften it, and divide it for the croquettes; spread a few bread crumbs on the pasteboard and shape; dip each piece into eggs little beaten, roll in bread crumbs again, then drop the croquettes into hog's fat and fry them.

Squirrel Pie.—Cut them up and parboil in water, with a little salt in it, for half an hour. Then proceed as in chicken pie.

Fish.—*Frying Fresh Fish.*—They should be wiped out with a clean cloth—not washed nor soaked in water. Never put them into cold fat. Let the lard, butter, or oil be first heated to a degree just short of burning, and then plunge in the fish—well rubbed with salt—the greater the quantity of fat, and the quicker the fish are cooked, the better they will be, as they give off their own fat instead of absorbing that in which they are cooked.

How to Boil Fish.—For all kinds of fresh fish, put two spoonfuls of salt to every quart of water; put the fish in with the water cold; remove the cover, and only let the water simmer. Try with a skewer whether the flesh of the fish stick to the bone; if so, it is not enough—if the flesh drop off, it is too much cooked. A mackerel will take from fifteen to twenty minutes, a haddock a little longer; a pound of fish takes from fifteen to twenty minutes.

Stuffed Fish.—Fill the fish with a stuffing of chopped salt pork and bread, or bread and butter, seasoned with salt and pepper, and sew it up. Then sew it into a cloth, or you can not take it up well. Put it in cold water, with water enough to cover it, salted at the rate of a tea-spoonful of salt to each pound of fish; add about three table-spoonfuls of vinegar. Boil it slowly for twenty or thirty minutes, or until the fin is easily drawn out. Serve with drawn butter and eggs, with capers or nasturtium in it.

Fish can be baked in the same way, except sewing it up in a cloth. Instead of this, cover it with egg and cracker, or butter crumbs.

Fish Chowder.—The best fish for chowder are haddock and striped bass. Cut the fish in pieces an inch thick and two inches square; take six or eight good-sized slices of salt pork; put them in the bottom of an iron pot, and fry them till crisped. Take out the pork, leaving the fat; chop the pork fine. Put in the pot a layer of fish, a layer of split crackers, some of the chopped pork, a little black and red pepper, a little chopped onion, then another layer of fish, split crackers, and seasoning. This do till you have

used your fish. Then just cover the fish with water and stew slowly till it is tender; thicken the gravy with pounded cracker; add catsup if you like. Boil up the gravy once, and pour over the fish; squeeze in the juice of a lemon. Add salt if necessary.

Curry Fish.—Put into the pot four onions and two apples, in thin slices, some thyme or savory, with a quarter of a pound of fat or dripping, three table-spoonfuls of salt, one table-spoonful of sugar, and fry for fifteen minutes; then pour in three quarts of water and one pound of rice; boil till tender; add one table-spoonful of curry-powder, mixed in a little water; cut up six pounds of cheap fish the size of an egg; add to the above, and boil for twenty or thirty minutes, according to the kind of fish. If salt fish is used, omit the salt. If no herbs, do without, but always use what you can get.

To Freshen Salt Fish.—Pour a little vinegar into the water, and soak the fish with the skin side up.

Codfish.—Salted codfish, if well freshened and cooked with milk, is one of the best kinds of animal food. It is nice freshened and broiled with butter; codfish and potatoes, and fish-balls are favorites with most persons.

Dish of Dried Salmon.—Pull some into flakes; have ready some eggs boiled hard, and chopped; put both into half a pint of thin cream, and two or three ounces of butter rubbed with a tea-spoonful of flour; skim it and stir till boiling hot; make a wall of mashed potatoes round the inner edge of a dish, and pour the above into it.

Stewed Oysters.—To a half can of fresh oysters poured into a stew pan, add about an ounce of butter, more if you like, about half a table-spoonful of flour previously stirred with a small quantity of milk; when nearly to the boiling-point add milk to the taste, then allow them to boil about two minutes. When preferred, the milk can be omitted.

Curried Oysters.—Wash a quart of oysters from their liquor; put the liquor into a saucepan; mix a quarter of a pound of butter with two table-spoonfuls of flour, and stir it into the liquor, with a table-spoonful of curry-powder, or such spices instead, as your taste may dictate. Let it come to a boil; put in the oysters, give them one boil, and serve in a deep dish.

Fried Oysters.—Select the largest oysters for frying. Take them out of their liquor with a fork, and endeavor in doing so to rinse off all the particles of shell which may adhere to them. Dry them between napkins; have ready

some grated cracker, seasoned with Cayenne pepper and salt. Beat the yolks only of some eggs, and to each egg add half a table-spoonful of thick cream. Dip the oysters, one at a time, first in the egg, then in the cracker crumbs, and fry them in plenty of hot butter, or butter and lard mixed, till they are of a light brown on both sides. Serve them hot.

Oyster Patties.—Put a fine puff crust into small patty-pans, and cover with paste, with a bit of bread in each; and when they are baked have ready the following to fill with, taking out the bread. Take off the beards of the oysters, cut the other parts in small bits, put them in a small tosser, with a grate of nutmeg, the least white pepper and salt, a morsel of lemon peel, cut so small that you can scarcely see it, a little cream, and a little of the oyster liquor. Simmer a few minutes before you fill. Observe to put a bit of crust into all patties, to keep them hollow while baking.

Yorkshire Pie.—Make a good crust of beef-suet and flour, and line your dish; fill with alternate layers of as many kinds of game as you can get, including venison, ducks, geese, turkeys, chickens, pheasants, quails, pigeons, etc., together with ham, oysters, and sausage—all the meat boned and well-seasoned with sweet herbs, filling the interstices with calve's feet jelly, and covering the whole with a crust with vent-holes—heat up gradually, and bake slowly for three or four hours; let it get cold, and then it will furnish variegated cuts, that would almost "raise an appetite beneath the ribs of death." A glorious dish for the Christmas holidays, a large family gathering, or a wedding occasion.

Eggs.—*Cooking in the Shell.*—There is but one way of cooking an egg, to have it in perfection, and that is, cook it in boiling water long enough to have both the white and the yolk just begin to thicken a very little, so that when the egg is opened it will run, and that the white shall not be hard but milky. Here you have all the taste and flavor of all parts of the egg in the highest degree, and that delicacy of touch which is very agreeable. It should not be boiled, but only scalded or coddled. The yolk first yields to the power of the caloric, and will be even firmly set while the white will be milky, or most tremulously gelatinous. The flavor, superior to any thing which a plover ever deposited, will be that which the egg of the gallinaceous domestic was intended to have; the substance, that which is delecta-

ble to the palate, and easy of digestion. There is perfect absence of that gutta serena quality, in the white especially, at once the result and the source of dyspepsia. Eggs would be much more patronized, and much more wholesome, if boiling were discarded.

One way to cook eggs is to drop them into boiling water, and let them remain there three minutes—the water all the time boiling. This hardens the white next the shell to almost leathery toughness, while within it is still uncooked. Another and preferable mode is, to pour boiling water upon the eggs; let them stand in this five minutes; pour off this, and add more boiling water, and immediately bring them to the table *in the water*. Those taken out at once will be somewhat cooked through; and those left in five minutes will be "hard boiled," or nearly so, and thus the taste of every one may be suited and no toughness of the whites be observed.

Eggs and Sausages.—Boil four sausages for five minutes; when half cold, cut them in half lengthways, put a little butter or fat in a frying-pan, and put the sausages in and fry gently, break four eggs into the pan, cook gently, and serve. Raw sausages will do as well, only keep them whole, and cook slowly.

Scrambled Eggs.—Put a tea-cupful of milk on to boil; put in a piece of butter the size of a walnut; salt, and dredge in a little flour; have three eggs well beaten, and stir them in quickly when it boils; stir it till it is thickened, not curdled. It is much improved by being turned over buttered toast in a deep dish.

Scrambled Eggs with Bread.—Put half a handful of bread crumbs into a sauce-pan, with a small quantity of cream, salt, pepper, and nutmeg, and let it stand till the bread has imbibed all the cream; then break ten eggs into it, and having beaten them up together, fry it like an omelet.

Fried Biscuit and Eggs.—Slice a few cold biscuit, or some dry, light-bread, fry them slightly in a little butter or nice gravy. Beat three or four eggs with half a tea-cupful of new milk and a pinch of salt. When the bread is hot, pour the eggs over it, and cover for a few minutes, stir lightly, so that all the eggs may be cooked.

A Plain Omelet.—Break six eggs into a basin, rejecting the whites of two; beat them till they are light. Strain them through a sieve, and season them with pepper and salt, or sugar, according as a savory or sweet omelet may be desired. Melt in the pan a piece of butter

about the size of a small walnut; be careful that it does not get hot. Whisk the eggs to the latest moment, and pour the mixture into the pan; stir the omelet gently with a spoon till it begins to thicken, then slip a little more butter beneath it. Shake the pan until the center of the omelet begins to set; fold it in half, place a dish on the top of the pan, and turn the omelet out.

Sweet Omelet.—Beat four eggs into a basin, add a table-spoonful of milk, a table-spoonful of sugar, a pinch of salt, and beat them well up; put some nice butter into a pan, put in the eggs, and fry. Serve with sugar sifted over.

Chopped Ham Omelet.—Six eggs well beaten, cold ham or raw, chopped fine, and stirred in, the whole well seasoned with salt, pepper, sugar, and mustard, making a very savory dish. Fry brown in a buttered pan and turn over in a half minute. Another way to cook ham is to cut out the slices very thin, broil nicely, and put a bit of butter on. Then heat up a pint of rich cream, with mustard, sugar, pepper, and other condiments; butter some slices of toasted bread and lay around the side of a dish, and turn the hot cream over, having first thickened it with a tea-spoonful of flour paste.

French Omelet.—Beat up one dozen eggs with a small cupful of new milk; salt to your taste. Have ready on the stove a large frying-pan or dripper; let it be sufficiently hot to melt a small piece of butter, just enough to grease the pan so that the egg will not stick to it; pour in enough of the egg to cover the bottom of the pan *very thin*; move the pan gently, first raising it on one side and then on the other, so as to expose the egg evenly to the heat. In a moment or so, the egg next to the pan is *jellified*; then peel it up from the pan with a spoon, and roll it lightly over and over till the whole comes off, and then it is sufficiently cooked, and may be put into a napkin and kept hot (not cooked any more), till another portion of the egg is cooked in the same way as the first.

The important thing to be observed in this process is to cook the egg evenly, and so slightly that it does not pass from the *jelly* stage, which is delicious and wholesome, to the *spongy* stage, which is tough and indigestible. An epicure would sprinkle in some sprigs of finely-chopped parsley, or thin shavings of ham, some kidneys chopped, or garnish the dish with nice apple sauce or jelly.

Green-Corn Omelet.—Grate the corn from twelve ears of corn, boiled, beat up five eggs, stir them with the corn, season with pepper and

salt, and fry the mixture brown, browning the top with a hot shovel. When fried in small cakes, with a little flour and milk stirred in for a batter, it is very nice.

Tomato Omelet.—Beat six eggs, mix two table-spoonfuls of flour in a little water, and add some salt and pepper; peel and chop very fine four tomatoes, stir this all together. Put a bit of butter the size of an egg into a frying-pan, heat it hot, turn on the mixture, stirring all the time until it begins to thicken, then let it stand to brown three minutes, flap it half over, slip it on a dish, and send it to the table very hot.

Professor BLOT states, that by placing omelets in the oven as soon as done, they are rendered more flaky.

Cooking Vegetables.—Put no green vegetables into the water for cooking till it boils, if you would have them retain all their sweetness. If you would have them retain their green color, such especially as asparagus and peas, not only put them at first into boiling water, suitably salted, but keep the kettle uncovered, and the water boiling till done. To counteract the hardness of the water, should it exist, add a little carbonate of soda with the salt.

Jerusalem Artichoke.—It was originally baked in pies, with dates, ginger, raisins, etc., but the modern way of serving them up, is to boil them until they become tender, when, after being peeled and stewed with butter and wine, they are considered very pleasant. Or, when cooked tender, browned in butter, or served with butter gravy.

Asparagus.—Cook as soon as possible after cutting, discarding all that is not brittle enough to break easily. Tie in small bunches, and boil in very little water, slightly salted, or steam them till tender; take them out, and put in a covered dish; add sufficient butter to the water to make a rich gravy, thickened with a little flour, and poured over the asparagus. To be eaten as thus prepared or spread over soft toast; or, when boiled soft, it may be chopped or mashed finely, and incorporated with well-beaten eggs, salted, with a little sweet cream added, and served as an omelet.

String Beans.—Gather them while young enough to break crispy; break off both ends and string them; break in halves, and boil in water with a little salt until tender; drain free from water and season with butter.

Baked Beans.—Take two quarts of middle-sized white beans, three pounds of salt pork, and one spoonful of molasses. Pick the beans

over carefully, wash, and turn about a gallon of soft water to them in a pot; let them soak in it lukewarm over night; set them in the morning where they will boil till the skin is very tender and about to break, adding a tea-spoonful of saleratus. Take them up dry, put them in your dish, stir in the molasses, gash the pork, and put it down in the dish, so as to have the beans cover all but the upper surface; turn in water till the top is covered; bake with a steady fire four or five hours, or let them remain in the oven all night. Beans are good prepared as for baking, made a little thinner, and then boiled several hours with the pork.

Cabbage.—Cabbage may be cooked in almost an endless variety of ways. Everybody knows how to boil it with pork and beef, but it does not agree with everybody's digestion in that form. A more delicate process is to cut it fine, not chopping, but shaving it, and put it in a tin basin, with just enough water to wet it through and keep it from burning. When it is well heated, and greened all through, put in a lump of butter as big as a hen's egg for one cabbage, and stir it through. Then beat up an egg in half a cup of vinegar, and add a table-spoonful of salt, and stir it well through, taking it immediately from the fire. It can easily be prepared in fifteen minutes, and is excellent.

Stuffed Cabbage.—Take a large fresh cabbage, and cut out the heart. Fill the vacancy with stuffing made of cooked chicken, or veal, chopped very fine, and highly seasoned, rolled into balls with yolk of egg. Then tie the cabbage firmly together, and boil in a covered kettle for two hours. It makes a very delicious dish, and is often a useful way of using up small pieces of cold meat.

Hot Slaw.—Take an egg, a tea-spoonful of flour, a table-spoonful of butter, with salt and pepper to taste, and stir in a tea-cup of vinegar, and let the whole come to a boil; have ready about a pint and a half of finely-cut cabbage, mix it thoroughly, cover it closely, and let it stew, stirring it frequently till tender, when serve.

Cardoons.—When cooked, the solid stalks of the leaves of the cardoon are to be cut in pieces about six inches long, and boiled like any other vegetable, in pure water, without salt, till they are tender. They are then to be carefully deprived of the slime and strings that will be found to cover them, and having been thus thoroughly cleansed, are to be plunged in cold water, where they must remain until they are wanted for the table. They are then taken

out and heated with white sauce, or marrow. The cleansing process just described, is for the purpose of rendering them white, and of depriving them of a bitterness which is peculiar to them. If this is neglected the cardoons will be black, not white, as well as disagreeable.

Cauliflower.—Put a good sized cauliflower in just enough boiling water to cover it, with a large tea-spoonful of coarse salt, and a piece of carbonate of soda the size of a moderate green pea, and boil for twenty-five minutes; then dish and drain out all the water, and put two ounces of butter on top of the cauliflower and cover close. Or, a sauce may be made for the cauliflower by stirring together a cup of butter, a table-spoonful of flour, half a cup of sweet cream, two or three yolks of eggs, with a little grated nutmeg to suit the taste, adding meat soup, or some of the liquor in which the cauliflower was boiled, and cook it five or ten minutes till it forms a somewhat thick sauce—a tea-spoonful of vinegar, or wine, will impart to the whole an excellent flavor.

Sweet Corn.—Trim off the husks and immerse in boiling water. Boil gently half an hour; then take out the ears, rub over some butter, pepper, and salt, and brown before a quick fire. Another plan, and one which most persons prefer, is to boil as above; afterward cut off the corn neatly; return to a pan containing a sufficient quantity of milk to cover; throw in a table-spoonful of butter, the same of sugar and salt, to flavor; simmer slowly for fifteen minutes, and serve up hot.

Succotash.—Green corn and shelled beans cooked together, and suitably seasoned with butter and salt. Succotash, says Mr. BEECHER, is a liquid compromise between corn and beans. It is perfect when its flavor is that of corn lapsing into bean, and of bean just changing into corn. In short, it is a dish whose flavor represents the evanishing point of both beans and corn, toward a mystic vegetable union in some happier sphere. But to be perfect there should always be a hierophantic bit of pork presiding over the nuptials, and giving its unctional blessing.

Cucumbers.—Slice them into cold water which soon extracts the acid from them, which causes their unwholesomeness. Salt is a good condiment for them, but get along with as little pepper and vinegar as possible.

Stewed Cucumbers.—Slice them thick, or halve and divide them into two lengths; strew some salt and pepper, and sliced onions; add a bit of butter. Simmer very slowly, and before serv-

ing, if no butter was in before, put some, and a little flour, or if there was butter in, only a little flour, unless it wants richness.

Egg-Plant.—It must be cooked before fully ripe. Pare, and cut in slices a quarter of an inch thick, placed in separate layers on a plate, each piece properly salted, and let them remain over night, or at least, two hours or more, the salt extracting a bitter quality. Pour off this dark liquid, fry brown, first one side and then the other, in butter or lard, first dipping each piece in a batter of eggs.

Baked Egg-Plant.—Select a good-sized plant, free from defect, cut off the top carefully, as it must be replaced, then scoop out with a large spoon all the pulp; mix with it a large spoonful of bread crumbs, a little salt, some nicely-rubbed thyme and summer savory, a little cayenne and a spoonful of butter; stir these well together, return it to the hollowed plant, then lay on the top which was cut off; lay it in a stew-pan with some thin slices of fat corned pork laid on the bottom, cover tightly and let it cook slowly for about an hour; take off the string and send to table hot or cold.

Hominy.—Wash slightly in cold water, and soak twelve hours in tepid, soft water, then boil slowly from three to six hours in same water, with plenty more added from time to time, with great care to prevent burning. *Don't salt while cooking*, as that or *hard water* will harden the corn. So it will peas or beans, green or dry, and rice also. When done add butter and salt; or a better way is to let each one season to suit the taste. It may be eaten with meat in lieu of vegetables, or with sugar or syrup. It is good hot or cold, and the more frequently it is warmed over, like bean porridge, the better it becomes.

Hominy and Beans.—Mix equal parts of cold baked beans and cold hominy together, and warm up, and you will have an excellent dish.

Hominy and Milk, hot or cold, is as much better than mush and milk, as that is better than oat-meal porridge.

Hulled Corn.—Shell a dozen ears of ripe, dry corn; put it in an iron kettle and cover with cold water; put in the corn a bag of two tea-cupsful of fresh wood ashes, and boil until the corn looks yellow and tastes strong of the alkali; then take out the bag and boil the corn in the lye over an hour; then pour off the lye, add fresh water and simmer until the corn swells. If the hulls do not come off by stirring, turn off the water and rub them with a

towel; add more water and simmer for three or four hours, often stirring to keep it from burning; when it swells out and becomes soft and white, add salt to liking, and let all the water simmer away. Eat warm or cold, with cream or milk.

Macaroni.—Put in an iron pot or stew-pan two quarts of water, let it boil; add two tea-spoonsful of salt, one ounce of butter; then add one pound of macaroni, boil till tender; let it be rather firm to the touch; it is then ready for use either for soup, pudding, or to be dressed with cheese. Drain it in a colander; put it back in the pan, add four ounces of cheese or more, a little butter, cream, salt, and pepper; toss it well together and serve. It will be found light and nutritious, and well worthy the notice of vegetarians, though cooked cheese is regarded as very indigestible for weak stomachs.

How to Cook Onions.—Peel, wash, and put them into boiling milk and water—water alone will do, but it is not so good; when nearly tender salt them; when tender take them up, pepper them and put some butter on them, when they are ready for the table. Or, chop them after they are boiled, and put them in a stew-pan, with a little milk, butter, salt, and pepper, and let them stew about fifteen minutes. This gives them a fine flavor, and they can be served up very hot.

Take large onions and parboil them; roast them before the fire with their skins, turning as they require; peel and send them to the table whole, served with melted butter.

Peel, slice, and fry them brown in butter or nice dripping.

Eggs and Onions.—Boil some eggs hard, preserve the yolks whole; cut the whites into slips, and add them to a few small onions which you have first fried in butter; give all a stir up, pour off the superfluous fat; dredge in a little flour; moisten it sufficiently with gravy; add seasoning to taste; let it come to a boil; put in the yolks, and when they are quite hot, serve.

Parsnips.—Parsnips are cooked as carrots, but they do not require as much boiling, and are sometimes served differently, being sliced lengthways, dressed with butter and pepper, or mashed with a little cream, some butter, and seasoned with pepper and salt. They are excellent fried, also made into a stew with pork and potatoes.

Green Peas.—These should be boiled in very little water, with a tea-spoonful of salt to a pint

of water, and if the peas are not very sweet add a little sugar. When they are young, fifteen minutes is sufficient to boil them. Drain them and add butter, pepper, and salt, to the taste.

Peas Stewed in Cream.—Put two or three pints of young green peas into a sauce-pan of boiling water; when they are nearly done and tender, drain them in a colander quite dry; melt two ounces of butter in a clean stew-pan, thicken it evenly with a little flour, shake it over the fire, but on no account let it brown; mix smoothly with it a gill of cream add half a tea-spoonful of white sugar; bring it to a boil, pour in the peas, and keep them moving until they are well heated, which will hardly occupy two minutes. Send them to table immediately.

Peas Pudding, with Corned Beef or Pork.—Wash and pick one quart of split peas; put into a cloth, not tied too closely; put them on in cold water, and let them cook slowly until tender; take them out and rub them through a sieve into a deep dish; mix with them two well-beaten eggs, a large spoonful of butter, and a little black pepper; stir these well together, then flour the bag well, put in the mixture, and tie as closely as possible; then put the pudding into the pot, which is boiling with the corned pork or beef, and let it cook one hour; serve hot with the meat.

Stewed Pea Shells.—These sweet shells or pods, so commonly assigned to the hogs or cows in our country, are very popular in Germany, simply stewed with a little butter and savory herbs.

Cooking Potatoes.—In boiling potatoes, if peeled, they lose much of their substance; but make an incision all around, and another cross-ways, or clip off a little of the largest end, to allow the steam to escape, and render them mealy; put them into water already boiling; when done, pour the water off, dash some cold water into the pot, and after a couple of minutes, pour this off, partly remove the pot-lid, and let the potatoes remain over the fire till the steam is evaporated.

Baked potatoes are excellent, healthful, and improve the blood. Care should be taken to select all alike in size, being sure to allow them just sufficient time to become nicely crisp and brown at the hour the remainder of the dinner is ready. They should not be allowed in the open oven one moment after "done," there to shrivel and shrink, as if protesting against delay; neither be sent to the table to wait five

or ten minutes the movements of some tardy husband and children.

Mashed potatoes, that are nicely pared, boiled, and dried, after turning off the water, seasoned richly with salt, cream, or milk and butter, are always good, always nice, if smoothed down into the dish with care, and prettily spotted with pepper.

The mashed potatoes left from dinner make a fancy dish for breakfast, by making into little cakes or patties, with the hand, and frying brown in drippings or butter. The butter should be hot when the cakes are put in.

The boiled potatoes left from yesterday's dinner are very good chopped *fine* and warmed for breakfast, in good milk and butter, with salt and pepper.

When you are boiling your tea-kettle to-night you can boil half a dozen good-sized potatoes, and when cold, slice them the *long* way, something less than a quarter of an inch in thickness. In the morning lay them one by one on the griddle, to slowly toast or brown in good butter or fat, salting them carefully and evenly after placing them in the covered dish. These are always excellent with coffee; and these or the potato balls are an addition to the tea-table. Still another way to fry is to pare the potato round and round like an apple, until all is used, cooking slowly and evenly, in a covered spider, until brown.

In the Spring, when potatoes are poor, difficulty is experienced in preparing them to relish—pare and cut them half an inch in thickness, putting them first in cold water for two or three hours, and then boil in salted water until tender; then pour off the water and put on cream or good milk, seasoning and thickening carefully with only a little flour. If watery, put a bit of lime in the water in which you cook them as large as a walnut; or the watery character of the potato may be rectified by placing them around the stove for several days.

Chinese Yam.—The best mode of cooking the yam is to parboil and bake them; the texture of the flesh becomes uniform, of a pearly and almost snowy whiteness; it is not watery but soft, and very delicate both in appearance and flavor.

Mock Sweet Potatoes.—Steam Irish potatoes well, and wring them in a towel to make them mealy; mash till there are no lumps left, and sweeten with common brown sugar, to the taste. They are now ready to be baked, fried, or made into puddings.

To Boil Rice.—Soak a tea-cupful of rice in

cold water, for six or eight hours, and put it in boiling water, just enough to absorb it all, and let it boil briskly for ten minutes, adding a little salt and half a pint of cream or a pint and half of milk. The grains are double the usual size, and very delicious. Too much boiling will make it paste-like, clammy, and indigestible.

Rice Croquettes.—To a pound of rice boiled soft and dry, salted to the taste, add one pint of milk, quarter of a pound of butter, quarter of a pound of sugar, the yolks of five eggs, and the grated rind of one lemon; let the mixture simmer over the fire, but not boil, for twenty minutes; then spread it on a large platter to cool; when cold cut in strips; dip in the whites of the eggs well beaten, and then in bread crumbs, and fry brown in very hot lard.

Rice Pilaff.—This truly delicious Oriental dish is thus made: Boil a sufficient quantity of rice in a large quantity of water. It should be put in cold water, with a little salt, and not stirred while cooking. When thoroughly done strain off the water through a colander or sieve and each kernel will be separate and solid. Then season with salt, pepper, butter, and a little tomato sauce; cut up (not very fine) roasted or boiled mutton, or veal, mix with rice in proportion of about two-thirds to one-third meat. Let them simmer together a few minutes, and serve hot with the meat gravy. The water that the rice has been boiled in makes the very best starch for fine work.

Salsify, or Vegetable Oyster.—Wash and scrape the roots clean; then slice in bits about half an inch thick, boil tender, mash fine, and mix with a batter of flour and eggs—say to a quart of salsify, two eggs and two table-spoonsful of flour. Put some butter in a frying-pan, and drop a large spoonful of the oyster batter in a place, and fry it a light brown.

Spinach.—This is the earliest and most welcome Spring vegetable, but it is very apt to be spoiled in the cooking. It is important to know that it does not require any water, the expressed juice being quite sufficient to keep it moist and free from burning. Boil it fifteen minutes, after a very careful washing and picking, in a covered sauce-pan without water, and with a little salt; drain thoroughly, and pour over egg sauce—mixing the flour with milk instead of water, and garnish with sliced hard-boiled eggs.

Summer Squash.—Put the squashes in boiling water whole, and boil briskly till tender, spread

a clean, coarse cloth over a colander, and lay them in it, cut a piece from each end, and remove the seeds with a spoon. Mash the squashes fine, press quite dry, and again place them over the fire a few minutes, and season with butter, pepper, and salt.

Stewed Tomatoes.—If very ripe, will skin easily; if not, pour scalding water on them and let them remain in it four or five minutes. Peel and put them in a stew-pan, with a table-spoonful of water, if not very juicy; if so, no water will be required. Put in a little salt, and stew them for half an hour; then turn them into a deep dish with buttered toast.

Baked Tomatoes.—Another way of cooking them, which is considered very nice by epicures, is to put them in a deep dish, with fine bread crumbs, crackers pounded fine, a layer of each alternately; put small bits of butter, and little salt and pepper on each layer—some cooks add a little nutmeg and sugar. Have a layer of bread crumbs on the top. Bake in three-quarters of an hour.

Browned Tomatoes.—Take large round tomatoes and halve them; place them, the skin side down, in a frying-pan in which a very small quantity of butter or lard has been previously melted; sprinkle them well with salt and pepper and dredge them well with flour; place the pan on a hot part of the fire, and let them brown thoroughly; then stir them and let them brown again, and so on until they are quite done. They lose their acidity, and the flavor is superior to stewed tomatoes.

Tomato Cheese.—Take a dozen large, ripe, tomatoes, scald, and remove the skin, then thoroughly mix them after cutting into slices, with a pound of sweet dried beef, shaved as thin as tissue paper. Put in with the tomatoes and beef the sweet white curd from a quart of milk, seasoned with pepper and ground cloves; put the whole into a stout bag of loosely woven linen, and after kneading and manipulating until all the ingredients are perfectly incorporated, first squeeze out every drop of liquid that can be forced through the cloth. Then place the material in a "hoop" from a round wooden spice box, by taking out the bottom and cutting in the edge four little notches as vents for the escape of any juice that may remain. Then place the removed bottom on the top of the mass as a "follower," and press twenty-four hours, and put by in a cool dry place. For use, shave in thin slices.

Turnips.—Take a slice off the top end and

cut off the tap-root close, leaving the other part of the paring on. It boils soft, is short grained, and helps the flavor of the turnips.

Salad Dressing.—Rub very fine through a sieve, the yolks of six eggs boiled thirty minutes; add the yolks of three *unboiled* eggs, one tea-spoonful of fine salt, one large table-spoonful of mustard, a very little cayenne pepper, if you like; one flask of very best oil, poured in very little at a time, and thoroughly beaten; two table-spoonfuls of vinegar. If you like it more acid, add more vinegar; if the dressing is too thick, add a little hot water or cream.

Chicken Salad.—Mince finely the white parts of one chicken previously well boiled. Take blanched, crisp celery and chop very fine. With one measure of the minced chicken mix one and a half measures of the chopped celery. Boil hard one large or two small eggs, roll the yolk fine, and mixing in a tea-spoonful of mustard, and nearly as much salt, with half a tea-cupful of vinegar; pour this over the chicken. Cut the boiled whites of the eggs in rings and lay on top, garnishing also with the smaller leaves of the celery. Usually the celery is not chopped half fine enough.

Meat Salad.—Ten or a dozen potatoes boiled and peeled, are cut up into small dice, as also two herrings, three pared apples, a quarter of a pound of roast veal, and as much boiled ham, one large pickled beet, and ten small cucumber pickles; all of them are cut up together, and dressed with oil freely, vinegar and salt sparingly, and a spoonful of French mustard.

Cabbage Salad.—A cold salad of cabbage is thus prepared: Slice very fine and lay in the dish. Beat up two eggs in a cup of vinegar; add a tea-spoonful of mustard, two tea-spoonfuls of sugar, one of salt, and a large lump of butter. Boil and turn over the cabbage. For a supper dish this is very nice eaten cold.

Boiled Celery Salad.—Cut the celery in slices, boil it, and lay it in the dish; dress it with cresses, endives, and radishes, and flavor with vinegar and oil.

Hominy Salad.—To a pint of cold hominy, add a small onion, a quarter of a boiled chicken, or about the same quantity of lobster, chopped fine, to which some add a small pickle. To be dressed with sweet oil, mustard, pepper, and vinegar. It is a very good substitute for green salads, at seasons when the latter can not be obtained.

Lettuce Salad.—This is made by simply cutting the lettuce into strips, and decorating it by a covering composed of the petals of roses,

pinks, lady's slippers, and the blossoms of wild chickory.

Sidney Smith's Winter Salad.

Two large potatoes, passed through kitchen sieve, Unwonted softness to the salad give,
Of mordant mustard add a single spoon—
Distrust the condiment which bites so soon;
But deem it not, thou man of herbs, a fault,
To add a double quantity of salt;
Three times the spoon with oil of Lucca crown,
And once with vinegar procured from town.
True flavor needs it and your poet begs,
The pounded yellow of two well-boiled eggs,
Let onion atoms lurk within the bowl,
And scarce suspected, animate the whole;
And lastly on the favored compound toss
A magic tea-spoon of anchovy sauce;
Then, though green turtle fail, though venison's tough,
And ham and turkey are not boiled enough,
Serenely fail, the epicure may say—
"Fate can not harm me—I have dined to-day."

Table Drinks.—Professor LOOMIS thus speaks of milk, tea, and coffee: "Milk contains in solution not only a due proportion of carbon, hydrogen, oxygen, and nitrogen, but all the other elements necessary for the construction of bone, nerve, etc., and hence is always a proper food in all circumstances of health. Tea derives its beneficial qualities not from its direct supply of nutrition, but from its affording a peculiar substance called *theine*, the effect of which in the system is to diminish the waste, thus making less food necessary. Tea thus has a positive economic value, not as a supplying but as a saving nutriment. Coffee, though of a taste so little allied to tea, derives its value in precisely the same manner and from nearly the same substances. Its value and effect in the system are therefore the same as those above stated. It is hence evident that milk, tea, and coffee are valuable articles of food under all conditions of temperature."

Housekeepers, especially in hotels and large boarding houses, are sometimes compelled from necessity to use milk for tea and coffee after the cream has risen. As a consequence one boarder will have the benefit of all the cream, and the others of the skim-milk from the cream pitcher. When several quarts are to be used, this may easily be remedied by running the milk through a common tin strainer, when the cream will be thoroughly broken up and mixed with the milk and look and be essentially like new milk. By this simple device many a housekeeper may maintain her character of furnishing something besides skim-milk for her boarders.

Never reduce coffee by adding hot water—use hot milk or cream. For such persons as find coffee disagrees with them, fill the cup two-

thirds full of boiling hot milk, sugar to the taste, and fill up half the space left with strong coffee.

When cream can not be had, the yolks of eggs beaten to a froth, and stirred gradually into cold milk, in the proportion of three to a pint, is a good substitute; pouring the milk and egg in the cup, and stirring with a spoon while filling with coffee.

Making Tea.—Good tea can not be made with hard water. Water can be made soft by adding a tea-spoonful of borax powder to an ordinary-sized kettle of water, in which it should boil; and the saving in the quantity of tea used will be at least one-fifth.

Mrs. STOWE informs us, that as we look to France for the best coffee, so we must look to England for the perfection of tea. The tea-kettle is as much an English institution as aristocracy or the prayer-book; and when one wants to know exactly how tea should be made, one has only to ask how a fine old English house-keeper makes it. The first article of her faith is that the water must not merely be hot, not merely have boiled a few moments since, but be actually boiling at the moment it touches the tea. Hence, though servants in England are vastly better trained than with us, this delicate mystery is seldom left to their hands. Tea-making belongs to the drawing-room, and high-born ladies preside at "the bubbling and loud-lissing urn," and see that all the due rites and solemnities are properly performed—that the cups are hot, and that the infused tea waits the exact time before the libations commence.

How to Make It.—First heat the tea-pot by pouring boiling water into it; pour this out, and put into the pot as much good tea as you wish to use; then pour in boiling water enough to completely cover the tea so as to wet it thoroughly. Set the pot on the cooking table, if that is handy (it need not be set on anything that is hot), and in five minutes pour in boiling water enough for the first cups, and pour out immediately. If a second cup, or cups, are wished, and tea enough has been put in the pot, add boiling water in sufficient quantity. This rule applies particularly to Japanese and Hyson teas. Perhaps black tea would not be as good made in this way, as if it were steeped longer. That may depend on taste.

To Make a Choice Cup of Tea.—Put, say half a tea-spoonful of tea into a cup, and fill with boiling water; and replenish with hot water as wanted. A slight infusion brings out the aroma, which is the agreeable and healthful qual-

ity of the tea, while the essential oil brought out by boiling or long steeping is disagreeable to the cultivated taste, and acts powerfully on the nerves.

Properties and Preparation of Coffee.—In an able article by Baron LIEBIG, in the *London Popular Science Review*, it is asserted that "tea acts directly on the stomach, whose movements sometimes can be so much augmented by it, that strong tea, if taken fasting, inclines to vomiting. Coffee, on the contrary, furthers the peristaltic movement downwards; and, therefore, the German man of letters, more accustomed to a sitting life, looks on a cup of coffee, without milk, and assisted by a cigar, as a very acceptable means of assisting certain organic processes.

"Coffee contains a crystalline substance, named *caffeine* or *theine*, because it is also a component part of tea. This matter is volatile, and every care must be taken to retain it in the coffee. For this purpose the berries should be roasted till they are of a pale-brown color; in those which are too dark there is no caffeine; if they are black the essential parts of the berries are entirely destroyed, and the beverage prepared from these does not deserve the name of coffee.

"The berries of coffee, once roasted, lose every hour somewhat of their aroma, in consequence of the influence of the oxygen of the air, which, owing to the porosity of the roasted berries, can easily penetrate. This pernicious change may best be avoided by strewing over the berries, when the roasting is completed, and while the vessel in which it has been done is still hot, some powdered white or brown sugar (half an ounce to one pound of coffee is sufficient). The sugar melts immediately, and by well shaking or turning the roaster quickly, it spreads over all the berries, and gives each one a fine glaze, impervious to the atmosphere. They have then a shining appearance, as though covered with a varnish, and they in consequence lose their smell entirely, which, however, returns in a high degree as soon as they are ground.

After this operation, they are to be shaken out rapidly from the roaster and spread on a cold plate of iron, so that they may cool as soon as possible. If the hot berries are allowed to remain heaped together, they begin to sweat, and when the quantity is large, the heating process, by the influence of air, increases to such a degree that at last they take fire spontaneously. The roasted and glazed berries should be kept

in a dry place, because the covering of sugar attracts moisture.

"If the raw berries are boiled in water, from twenty-three to twenty-four per cent. of soluble matter is extracted. On being roasted till they assume a pale chestnut color, they lose fifteen to sixteen per cent., and the extract obtained from these by means of boiling water is twenty to twenty-one per cent. of the weight of the unroasted berries. The loss in weight of the extract is much larger when the roasting process is carried on till the color of the berries is dark-brown or black. At the same time that the berries lose in weight by roasting they gain in volume by swelling; one hundred volume of green berries give, after roasting, a volume of one hundred and fifty to one hundred and sixty; or two pint measures of unroasted berries give three pints when roasted.

"The usual methods of preparing coffee, are, first, by *filtration*; second, by *infusion*; third, by *boiling*.

"*Filtration* gives often, but not always, a good cup of coffee. When the pouring of boiling water over the ground coffee is done slowly, the drops in passing come in contact with too much air, whose oxygen works a change in the aromatic particles, and often destroys them entirely. The extraction, moreover, is incomplete. Instead of twenty to twenty-one per cent. the water dissolves only eleven to fifteen per cent., and seven to ten per cent. is lost.

"*Infusion* is accomplished by making the water boil, and then putting in the ground coffee; the vessel being immediately taken off the fire and allowed to stand quietly for about ten minutes. The coffee is ready for use when the powder swimming on the surface falls to the bottom on slightly stirring it. This method gives a very aromatic coffee, but one containing little extract.

"*Boiling*, as is the custom in the East, yields excellent coffee. The powder is put on the fire in cold water, which is allowed merely to boil up a few seconds. The fine particles of coffee are drunk with the beverage. If boiled long, the aromatic parts are volatilized, and the coffee is then rich in extract, but poor in aroma.

"As the best method, I adopt the following, which is a union of the second and the third:

"The usual quantities both of coffee and water are to be retained; a tin measure containing half an ounce of green berries, when filled with roasted ones, is generally sufficient for two small cups of coffee of moderate strength, or one, so called, large breakfast cup (one pound

of green berries, equal to sixteen ounces, yielding after roasting twenty-four tin measures [of one-half ounce] for forty-eight small cups of coffee).

"With three-fourths of the coffee to be employed, after being ground, the water is made to boil for ten or fifteen minutes. The one-quarter of the coffee which has been kept back is then flung in, and the vessel immediately withdrawn from the fire, covered over, and allowed to stand for five or six minutes. In order that the powder on the surface may fall to the bottom, it is stirred round; the deposit takes place, and the coffee poured off is ready for use. In order to separate the dregs more completely, the coffee may be passed through a clean cloth; but generally this is not necessary, and often prejudicial to the pure flavor of the beverage.

"The first boiling gives the strength, the second addition the flavor. The water does not dissolve of the aromatic substances more than the fourth part contained in the roasted coffee.

"The beverage when ready ought to be of a brown-black color; untransparent it always is, somewhat like chocolate thinned with water; and this want of clearness in coffee so prepared does not come from the fine grounds, but from a peculiar fat resembling butter, about twelve per cent. of which the berries contain, and which, if overroasted, is partly destroyed.

"In the other methods of making coffee, more than the half of the valuable parts of the berries remains in the 'grounds,' and is lost."

Coffee may be too bitter, says Count RUMFORD, but it is impossible that it ever should be too fragrant. The very smell of it is reviving, and has often been found to be useful to sick persons, and to those who are afflicted with the headache. In short, everything proves that the volatile, aromatic matter, whatever it may be, that gives flavor to coffee, is what is most valuable in it, and should be preserved with the greatest care, and that in estimating the strength or richness of that beverage, its fragrance should be much more attended to, than either its bitterness or astringency.

It is not generally known that coffee which has been beaten is better than that which has been ground. Such, however, is the fact, and, in his brief article on the subject, SAVARIN gives what he considers the reason for the difference. As he remarks, a mere decoction of green coffee is a most insipid drink, but carbonization develops the aroma, and an oil which is the peculiarity of the coffee we drink. He agrees with other writers, that the Turks excel

in this. They employ no mills, but beat the berry with wooden pestles in mortars. When long used these pestles become precious, and bring great prices. He determined, by actual experiment, which of the two methods was the best. He burned carefully a pound of good Mocha and separated it into two equal portions. The one was passed through the mill, the other beaten, after the Turkish fashion, in a mortar. He made coffee of each. Taking equal weights of each, and pouring on an equal weight of boiling water, he treated them both precisely alike. He tasted the coffee himself, and caused other competent judges to do so. The unanimous opinion was, that coffee beaten in a mortar was far better than that ground in a mill.

The best coffee is the Mocha, the next is the Java, and closely approximating is the Jamaica and Berbice. Prime Rio is a very good article; Laguyra is probably the mildest of all. A mixture of Java and Mocha makes a rich drink—to four table-spoonsful of Java, half a spoonful of Mocha for a quart.

French Coffee.—Mrs. STOWE thus most appetizingly describes the French mode of making coffee. In the first place, then, the French coffee is coffee, and not chicory, or rye, or beans, or peas. In the second place it is freshly roasted, whenever made—roasted with care and evenness in a little revolving cylinder, which makes part of the furniture of every kitchen, and which keeps in the aroma of the berry. It is never overdone, so as to destroy the coffee flavor, which is, in nine cases out of ten, the fault of the coffee we meet with. Then it is ground and placed in a coffee-pot with a filter, through which it percolates in clear drops, the coffee-pot standing on a heated stove to maintain the temperature. The nose of the coffee-pot is stopped up, to prevent the escape of the aroma during this process. The extract thus obtained is a perfectly clear, dark fluid, known as *café noir*, or black coffee. It is black only because of its strength, being in fact almost the very essential oil of coffee. A table-spoonful of this in boiled milk would make what is ordinarily called a strong cup of coffee. The boiled milk is prepared with no less care. It must be fresh and new, not merely warmed, or even brought to a boiling point, but slowly simmered until it attains a thick, creamy richness. The coffee mixed with this, and sweetened with that sparkling beet-root sugar which ornaments a French table, is the celebrated *café-au-lait*, the name of which has gone round the world.

Brazilian Coffee.—For each cup the size of our tea-cups, to be made, the Brazilians measure a table-spoonful of ground coffee, parched to the color of a ripe chestnut. This is placed in a gauze bag, within the coffee-pot, and boiling water is poured upon it. There are no “grounds” in the decoction; and it is so strong that it leaves a brown stain upon the white china cup. The Brazilians never put milk in their coffee, as they think that milk injures the properties of the decoction, and it is never drank until the close of the meal. Usually it is never brought to the table until everything else is removed.

Professor BLOT on Coffee.—Grind your coffee finer than it is generally sold at the stores. Have the coffee fine because you can better extract the strength. The reason why coffee is muddy is that it is boiled. By boiling coffee you lose the best part. When you boil coffee you extract the volatile oil that makes it so very bitter. As to quantity, use as much as to make it to your taste; begin with two ounces to a quart of water, reduce it if too strong, and increase it if too weak. It is better when three or four kinds of coffee are used; one gives the body, the other the taste; and the third the color, etc.

Cold Coffee.—Coffee kept from meal to meal, with the intention of renewing for use, should not stand in tin. Let it be poured into an earthen dish, and the coffee-pot be washed and dried each time of using. There are few things that will take a flavor more readily than coffee.

Rye Coffee, etc.—Take a peck of rye and cover it with water, let it steep or boil until the grain swells or commences to burst, then drain and dry it. Roast to a deep brown color, and prepare as other coffee, allowing twice the time for boiling. Serve with boiled milk.

Barley, peas, and sweet corn may be prepared and used in the same manner. One-third real coffee may be added to the ground rye, corn, etc., quite advantageously.

Sweet Potato, Carrot, and Chicory Coffee.—Cut up sweet potatoes fine enough to dry conveniently, and when dried, grind in a coffee-mill; dry them by the fire or stove, or by the sun; grind and use, mixed with coffee in such proportions as you like; some omit half of the coffee, some more.

Prepare carrots and chicory in the same manner. All these vegetable substitutes for coffee have the double merit of being cheap and wholesome, except perhaps, chicory—

some writers commending it, while, according to some medical authorities, its habitual use is anything but conducive to health, producing heart-burn, loss of appetite, nervous derangements, alternate constipation and diarrhea, etc.

Chocolate.—Use four table-spoonsful of best grated chocolate for one quart of water; mix free from lumps with little water, and boil fifteen minutes. Then add one quart of rich milk; bring it to a boil, grating in nutmeg, and sweeten to the taste, adding cream as poured out at the table.

German Chocolate.—Four large table-spoonsful of the best grated chocolate, adding gradually two quarts of rich milk, the whites of four and yolks of two eggs, beaten light but not separated; add a gill of cold milk, and beat well; add gradually a coffee-cup of the chocolate to the milk and egg while hot, beating constantly. Take the chocolate from the fire, keep it hot, but not boiling, and add the egg and milk gradually; stir constantly to prevent curdling; flavor with nutmeg, vanilla, or cinnamon, to suit the taste; and sugar, if desired—the Germans use none. The egg is to be added just before serving in chocolate bowls. A very delicious drink.

Pies and Tarts.—An excellent article of pie crust is thus made: Pour on the bread-board one pint best flour, and divide it into two parts. Mix with cold water one-half the flour into a soft dough, and work or beat with your rolling-pin until it *blisters*, occasionally drawing up some of the dry flour to prevent the dough adhering to the board. Then roll as thin as possible, and at intervals of about two inches, place lumps of butter the size of a hickory-nut. Fold the dough up thus: Turn the outer edge toward you, and then the one nearest you to meet the first; fold one of the ends toward your left, and the other over it, and roll out thin again. Repeat this operation four times, and if the directions are closely observed, you will have "magic pastry," for the more it is rolled the more flaky it will become. You should bake in a quick oven, and if the pastry is placed in the pie plates, and allowed to sit in a cool place an hour before putting in the fruit or *mixture*, it will be improved. Lard may be used if you can not obtain butter—a half pound of the latter is sufficient, but less lard.

Another.—An excellent pie crust may be made by taking about a quart of bread sponge in the morning before you bake, add thereto

one beaten egg, nearly a tea-cupful of melted butter and some flour; knead a little and set in a warm place to rise. When light it may be kneaded over, and does not need to be very stiff; then roll out like any pie crust. A little butter spread on the upper crust, that folded down and rolled again, makes it flaky. If the pies are made of uncooked apples, the crust will be much lighter to stand a half hour or so after being made, before putting in the oven. Less butter will do very well.

Pie Crust Without Lard.—Take good rich buttermilk, soda, and a little salt, and mix just as soft as can be mixed and hold together; have plenty of flour on the molding-board and rolling-pin; roll very thin; then make and bake as other pies, or rather in a slower oven, and when the pie is taken from the oven, do not cover it up. This is not so white and flaky, but in this way a dyspeptic can indulge in the luxury of a piece of pie.

Apple Pie.—Line your plate with paste, slice your apples *very* thin into the plate, sprinkle on as much sugar as you would think the apple required (apples vary so in sweetness you can not be governed by any rule), a little rose water, and nutmeg to taste; cover with the upper paste, make a small incision in the middle of the upper crust, and bake. Many people think these the nicest kind of apple pie.

Dried Apple Pie.—Soak the apples two or three days in just enough cold water to cover them; slice them as if they were green apples, or beat them into a fine pulp, adding two or three spoonsful of water to each pie, or some domestic wine instead, with lemon, cloves, or cinnamon to suit.

Apple Custard Pie.—Take four apples, pare and stew them soft; to this add the yolks of two eggs; sweeten and flavor with lemon—the grated rind or extract. Prepare the crust the same as for custard; while baking, prepare the frosting—white of two eggs and six spoonsful of sugar. As soon as taken out of the oven, spread the frosting on top, and set it back into the oven; let it stand till a light brown.

Imitation Apple Pie.—Use raw pumpkin instead of green apples; slice thin; add equal parts of vinegar and water, thicken with wheat flour, season to suit the taste, and bake thoroughly. It requires more salt and longer baking than apple pie, but when done it is in no respect inferior.

Cheese Cake Pie.—Two cakes of cottage cheese, four eggs, a piece of butter about the size of a large egg, the rind and juice of one lemon, one

nutmeg; sugar to your taste; add lemon enough to make it like pumpkin pies.

Cocoa-Nut Pie.—Take one and a half cups of sugar, one and a half cups of milk, three eggs, one table-spoonful of butter, the rind of one lemon, and one cocoa-nut finely grated.

Cracker Pie.—Spread two crackers made fine over your pie crust on the plate, over which spread evenly 'about two-thirds of a cup of sugar; dissolve a tea-spoonful of tartaric acid in a tea-cupful of cold water, putting in a small tea-spoonful of the extract or essence of lemon, then pour all the wetting over the pie, and put on the top crust.

Cranberry Pie.—A correspondent of the *Country Gentleman* says the way of making open-topped, like a custard or squash pie, is not so good as to cover like an apple pie. The berries should not be stewed, as some do, before baking, but slit each berry with a knife. This will preserve the freshness of the fruit, which is quite an important thing. A coffee-cupful of berries and an equal quantity of white sugar, will make a medium-sized pie. Those who like a sweet pie should have more sugar, also more berries if desired. Bake as usual. A little flour sifted over the fruit gives it a thicker consistence. One thing should not be forgotten—add a small tea-cupful of water. The recipe is: One coffee-cupful of slit berries, the same quantity of white sugar, half the quantity of water, with a little flour added or not.

* *Cream Pie.*—Mix together one egg, a cupful of sugar, butter the size of an egg, three cupsful of flour, one tea-spoonful of cream of tartar, half a tea-spoonful of soda, and a cupful of sweet milk. Pour this on tin plates, and bake light brown. When cold split them open, and put in the custard made as follows: Take two eggs, one cupful of sugar, half a cup of flour, a pint of milk; flavor with lemon. Beat the eggs, sugar, and flour together; boil the milk, and while boiling stir in the mixture, letting it cook a few seconds. The above quantity will make three common-sized pies. If you wish it extra, make a frosting of the whites of the eggs and three table-spoonsful of sugar. Spread this evenly over the pies, and set again in the oven, and brown slightly.

Custard Pie.—Beat four eggs without separating, and add the foam, as fast as it rises, to a quart of rich, new milk, sweeten to taste, add a salt-spoon of salt, and fill the plates after the bottom crust has baked; and bake until the custard is solid, and served cold. Nutmeg,

vanilla, bitter almond, or lemon, may be used as flavor, if desired.

Lemon Custard Pie.—Grate the rind of a lemon, and after squeezing it until you have all the juice, wash the pulp in a tea-cupful of clear water; then add the water to the juice, with the grated rind, and one tea-cupful of sugar; put over the fire, and let it boil hard. When a little cool, add one egg well beaten, and a table-spoonful of flour, or rolled crackers. Bake with an under crust. One lemon makes one good pie.

Graham Pie.—Pies are generally condemned in all systems of dietetics, pretending to be physiological; while plain puddings are as generally commended, or at least allowed; but pies can be so made as to be really more healthful than the plainest puddings. The great objection to pastry, as usually found, is its bad preparation. Unbolted flour, milk, and sugar, with a little sweet cream, are in themselves unobjectionable; and they can be put together in the form of pastry, as well as eaten unmixed. The crust should be made of Graham flour, or equal parts of Graham flour and farina, and shortened with sweet milk and a little fresh cream. For the contents, it only requires some kind of fresh or good dried fruit—blackberries, whortleberries, apples, pears, peaches, etc.—and sufficient sugar or molasses to make them palatable.

Indian Florendines.—One quart of milk, three eggs, one ounce of butter, two table-spoonsful of brandy, sugar to the taste, as much Indian meal as will make the milk as thick as pap. When the milk boils, stir in the Indian meal till it is thickened about like pap, then add the butter. Set it off to cool. When cold, stir in the eggs, which must have been well beaten, then the sugar and brandy. They are very good without brandy. Make a paste, cover your pie-plates, pour in the above mixture, and bake in a moderate oven.

Lemon Pie.—Grate the yellow part of the peel of one large lemon, and add it with the juice to two-thirds of a cup of sugar; mix smoothly one and one-half table-spoonsful of flour in three-quarters of a tea-cupful of water; stir all together, and add the well-beaten yolks of two eggs; bake with only an under crust, to a nice golden brown color; when done, pour over the tops the whites of two eggs beaten to a stiff froth, with two table-spoonsful of powdered white sugar; set in the oven for a few minutes to harden.

Rich Mince Pie.—Five pounds of beef, four pounds of suet, five pounds of raisins, five pounds of sugar, half a pound of citron, eight crackers pounded fine, two lemons chopped fine, rind and all, two dozen apples chopped, three pints of cider, one quart of molasses, one quart of wine, one quart of brandy, one quince boiled and chopped, water the quince is boiled in, one gill of rose water, two table-spoonsful of salt, eight tea-spoonsful of cloves, thirteen tea-spoonsful of cinnamon, four tea-spoonsful of mace, nutmegs grated on the pies before baking; also spread butter and sugar on; mix molasses, crackers, cider, and spice together; then mix them with the rest of the ingredients; mix sugar with wine. If you like them richer add fruit, sugar, and spice.

Plain Mince Pie.—Neat's tongue and feet make the best mince pies. The shank is good. Boil the meat till very tender, take it up, clean it from the bones and gristle, chop it fine, mix it with an equal weight of tart apples chopped fine. If the meat is lean, put in a little butter or suet. Moisten the whole with cider, new, if you have good; sweeten it to the taste with sugar and a little molasses—seasoning with salt, cinnamon, cloves, and mace. Make the pies on flat plates, with holes in the upper crust, and bake from thirty to forty-five minutes.

Cracker Mince Pie.—Take three large crackers, one cup of vinegar, one cup of molasses, two cups of sugar, a piece of butter the size of an egg, raisins and spice to your taste. This will make three pies.

Egg Mince Pies.—Boil six eggs hard, shred them small; shred double the quantity of suet; then put currants, washed and picked, one pound, or more, if the eggs were large; the peel of one lemon shred very fine, and the juice; six spoonsfuls of sweet wine; mace, nutmeg, sugar, a very little salt; orange, lemon, and citron, candied. Make a light paste for them.

Lemon Mince Pies.—Squeeze a large lemon, boil the outside till tender enough to beat to a mash; add to it three large apples, chopped, and four ounces of suet, half a pound of currants, four ounces of sugar; put the juice of the lemon and candied fruit as for other pies.

Peach Pie.—Fill the pasted pie-plate with peeled and halved peaches; add a piece of butter the size of a walnut, a little sugar—be cautious of using too much sugar—and dust over a little flour. Cover with paste, and bake in a moderate oven. Serve with cream, if you have it; but it is good enough without.

Pie-Plant Pies.—Strip the pie-plant, or rhubarb, cut it into small pieces, and let it stand in cold water, enough to cover it, about an hour. Then drain off the water, and put the rhubarb into a stew-pan, with a table-spoonful of water, as almost sufficient water adheres to the plant to stew it in. Stew until tender, and strain it through a colander to remove the stringy part, which is a work of patience. Sweeten it to taste, put it back into the stew-pan and let it scald up with the sugar. Set it away to cool. Make a pie crust, line your plates, fill and make into tarts, with strips across instead of an upper crust, and bake.

Pine-Apple Pie.—Pare and grate large pine-apples, and to every tea-cupful of grated pine-apple add half a tea-cupful of fine white sugar; turn the pine-apple and sugar into dishes lined with paste, put a strip of the paste around the dish, cover the pie with paste, wet and press together the edges of the paste, cut a slit in the center of the cover, through which the vapor may escape. Bake thirty minutes.

Potato Pie.—Boil common or sweet potatoes until well done. Mash and strain them; to a pint of the potatoes add a pint and a half of milk, half a tea-cup of sweet cream, or a little melted butter, two eggs, and sugar, salt, nutmeg, or lemon to the taste.

Pork Apple Pie.—Spread your crust over a large, deep plate; place alternate layers of thin slices of salt fat pork and apples, three or four layers each, with a little spice, pepper, and sugar between, with a top crust, with ventilation. * Bake an hour.

Pumpkin or Squash Pie.—Stew the pumpkin or squash as long as possible, until the juice is all dried up; strain through a colander, and add milk and cream to a proper consistency; sweeten with half sugar and half molasses; add a little ginger; eggs are useless; flour makes them pasty, and stewing them and straining the juice off and throwing it away takes off all the sweetest part of the pumpkin.

Another excellent and plain way is, after the pumpkin or squash is stewed, add boiling milk until it is one-third thicker than the ordinary preparation; then thin and sweeten with an equal quantity of molasses, and bake an hour in a hot oven.

Raspberry Pie.—Pick over the raspberries—they will not bear washing—put them into a deep dish lined with paste, spreading sugar in the bottom of the dish; cover the raspberries with sugar, dredge them with flour, and bake half an hour.

Rice Florendines.—One quart of milk, eight eggs, sugar to the taste, a quarter of a pound of butter, one tea-spoonful of cinnamon, one tea-spoonful of nutmeg, brandy or rose water to the taste, rice flour enough to thicken the milk. Boil the milk and stir in enough rice flour, mixed with cold milk, to thicken it about as stiff as thick molasses. Add the butter while it is hot. Beat the eggs, stir them in when it gets cold, and add the other ingredients; bake in pie-plates, with an under-crust only.

Rice Pies.—If you like a rice pie, take care not to use too much rice; let the solidity consist in the eggs.

Strawberry Pie.—Fill your pie-dish, lined with crust, with ripe strawberries of medium size; sprinkle on a little flour, and sugar in proportion to the acidity of the berries. Cover with a thin crust, with a vent-hole. Blackberry and whortleberry pies are made in the same manner.

Raspberry Tart.—Roll out some thin puff paste, and lay it in a patty-pan of what size you choose, put in raspberries, strew over them fine sugar; cover with a thin lid, and then bake. Cut it open, and have ready the following mixture, warm: Half a pint of cream, the yolks of two or three eggs well beaten, and a little sugar; and, when this is added to the tart, return it to the oven for five or six minutes.

Rhubarb Tart.—Cut the stalks in lengths of four or five inches, and take off the thin skin. If you have a hot hearth, lay them in a dish, and put over a thin syrup of sugar and water, cover with another dish, and let it simmer very slowly an hour, or do them in a block-tin saucepan. Under crust.

Strawberry Tart.—May be made the same as raspberry; or, make a syrup of one pound of sugar and a tea-cup of water; add a little white of eggs; let it boil, and skim it till only a foam arises; then put in a quart of berries free from stems and hulls; let them boil until they look clear and the syrup is quite thick. Finish with fine puff paste.

Other fruit tarts, apple, peach, plum, etc., are all made so similarly that special directions need not be repeated.

Tomato Pie.—Take ripe tomatoes, skin and slice. Sprinkle over a little salt and let them stand a few minutes, pour off the juice and add sugar, half a cup of cream, one egg, nutmeg, and cover with a rich paste, and bake in a moderate oven over half an hour. This makes an excellent and much approved pie.

Vinegar Pie.—Mix two cups of vinegar, one

and a half of sugar, two table-spoonfuls of flour, and a piece of butter the size of a walnut. Prepare a paste to receive these ingredients, and bake the same as any ordinary pie.

Puddings.—*Pudding Paste.*—Take one pound of flour, half a pound of beef or mutton suet, chopped rather fine; the first is preferable; form well with your hand in the center of the flour, add the suet, a tea-spoonful of salt; moisten all with water, working the flour in by degrees, till it forms a stiff paste; work it well for two minutes; throw a little flour on the slab with the paste on it, let it remain five minutes, then roll it out any thickness you like.

Pudding Sauce.—Three-quarters of a cup of butter, a cup and a half of sugar, one egg, juice and grated rind of a lemon, all beaten well together. Just before serving, pour on the beaten mixture one pint of boiling water. A good sauce for all sorts of puddings.

Cream Sauce.—Boil half a pint of cream and turn it upon half a pound of powdered sugar. Boil it once more, and flavor with lemon or peach—an extract of the latter can be easily made by steeping fresh peach leaves.

Fruit Sauce.—Stew a dozen plums or cherries, or a couple of peeled and cored apples. Boil a pint of cream, or good milk, and pour it over a pound of powdered sugar; add the fruit, and if you choose, flavor.

Wine Sauce.—Into a gill of thick melted butter put a table-spoonful of powdered sugar, a quarter of a nutmeg grated, a tea-spoonful of lemon syrup, three glasses of good wine (of mixed kinds if you have more than one); stir well together, and serve quite hot.

Cheap Sauces.—Stir a spoonful of butter into a pint of fresh milk, sweeten and flavor; cook until it thickens and tastes done. Or, melt a piece of butter as large as an egg into a pint of good hot custard. Flavor with brandy and nutmeg.

Apple Pudding.—Boil six fair-sized apples well, take out the cores, put with them a half a pint of milk thickened with three eggs, a little lemon peel, and sugar to the taste; put puff paste round your dish, bake it in a slow oven; grate sugar over it, and serve it hot.

Apple Tapioca Pudding.—Soak a tea-cup of tapioca in a quart of warm water, adding a tea-spoonful of salt, and keep in a warm place. Pare and slice eight large tart juicy apples; butter well the pudding dish, place the tapioca, apple, and sugar in alternate layers until the dish is filled, having the tapioca on top, on

which place bits of butter, adding, if the dish will allow, a little more warm water. This must in all cases be eaten warm with cold sauce. It is highly nutritious, and commends itself particularly to the sick.

Dried Apple Pudding.—Boil dried apples nearly done; then, after saving a tea-cup of the juice for a sauce, chop them, and mix them with soaked bread, and boil in a bag. Make a sauce of melted butter, sugar, and flour, with enough of the apple juice to give it the flavor of wine, and spice with nutmeg.

Arrowroot Pudding.—Mix a table-spoonful of arrowroot in two of cold milk, pour it into a pint of boiling milk, in which dissolve a tea-cup of white sugar; stir it occasionally, and add a little mace, or other kind of spice, and four eggs. Bake it half an hour in a dish lined with paste. If it is preferred to look clear, substitute water instead of milk, and add one more egg.

Bean Pudding or Pie.—Wash clean one quart of white beans; then pour boiling water over, letting them remain till morning; then put on in cold water—this method destroys much of the strong taste of the beans; let them boil slowly but steadily; when perfectly tender and mealy, take out and drain; then mash with a spoon through a sieve. When you have thus obtained one and a half pints of the pulverized beans, add half a pint of sweet cream or milk, four eggs, three-quarters of a pound of sugar, a piece of butter the size of a hen's egg, and one nutmeg. Season to taste, with lemon or vanilla, the latter is the better neutralizer of the taste of the beans. These proportions will make one large pudding, or three pies, provided the plates are not too deep.

Berry Pudding.—Coffee-cup of sweet milk, one-third cup of molasses, one egg, a little salt, a little saleratus, three and a half tea-cups of flour. Beat all with a spoon. Flour three pints of berries, and stir in with a knife. Steam three hours. Sauce.

Black Pudding.—Half a pint of molasses, half a pint of water, two tea-spoonful of saleratus, one tea-cup of raisins rolled in flour, or a tea-cup of plums, cherries, or currants, dried with sugar. Put into a mold, crock, or pail, large enough to leave one-half for swelling. If boiled in an open crock, tie a thick cloth over the top. Boil steadily three hours.

Bread Pudding.—An economical one when eggs are dear. Cut some bread and butter very thin, place it in a pie-dish as lightly as possible, till three-parts full; break into a basin one

egg, add two tea-spoonful of flour, three of brown sugar; mix all well together, add to it by degrees a pint of milk, a little salt; pour over the bread; bake in an oven; it will take about half an hour; this will make a nice-sized pudding for or five persons.

Brown Bread Pudding.—Half a pound of stale brown bread grated, half a pound of currants, half a pound of shred suet, sugar, and nutmeg; mix with four eggs, and two spoonful of cream or milk; boil in a cloth or basin, that exactly holds it, three or four hours. Sauce.

Cocoa-Nut Pudding.—Break the cocoa-nut and save the milk; peel off the brown skin, and grate the cocoa-nut very fine. Take the same weight of cocoa-nut, fine white sugar and butter; rub the butter and sugar to a cream and add five eggs well beaten, one cup of cream, the milk of the cocoa-nut, two table-spoonful of farina, corn starch or rice flour, and a little grated lemon. Line a dish with rich paste, put in the pudding and bake one hour. Cover the rim with paper if necessary.

Chocolate Pudding.—Scrape up one pound of the best chocolate, and dissolve it in a tea-cupful of boiling water; then mix with six tea-cupful of fresh milk; let it come to a boil. It then is ready for the table. If you will add eight well beaten eggs to the above preparation, with sugar, and bake it in cups, you will have a nice chocolate pudding.

Corn Starch Pudding.—One quart of sweet milk brought to a boil, add a little salt, two eggs well beaten, three heaping table-spoonful of corn starch, with the addition of a little sweet milk. Stir well. It will cook in four or five minutes. Serve with sweetened cream.

Cracker Pudding.—One quart of milk, three crackers, six eggs, a small piece of butter; spice and raisins to taste.

Cranberry Pudding.—A pint of cranberries stirred into a quart of rather stiff, good batter, makes a nice pudding, eaten with sweet sauce.

Cranberry Roll.—Stew a quart of cranberries in just water enough to keep them from burning; make it very sweet, strain it through a colander, and set it away to cool. When quite cool make a paste as for apple pudding, spread the cranberries about an inch thick, roll it up in a floured cloth and tie it close at the ends; boil it two hours, and serve with sweet sauce. Sweet apples, or any other kind of fruit may be served in the same way.

Cream Pudding.—One pint of cream, seven eggs, and half a pound of flour, a little salt. Stir the cream and flour together, and add the

eggs after they are well beaten. Bake half an hour, and eat with sauce.

Custard Pudding.—One quart of milk, eight eggs, half a pound of sugar; season with lemon or peach, pour it into a pudding dish wet with cream, set the pudding into a pan half full of water, and put them into the oven to bake for three quarters of an hour. If preferred line the baking dish with delicate cream paste. Less egg will make a good custard.

Apple Dumplings.—Pare and scoop out the core of six large baking apples, put part of a clove and a little grated lemon peel inside of each, and enclose them in pieces of puff paste; boil them in nets for the purpose, or bits of linen for an hour. Before serving, cut off a small bit from the top of each, and put in a tea-spoonful of sugar and a bit of fresh butter; replace the bit of paste, and strew over them pounded loaf sugar. In the absence of apples ripe tomatoes are sometimes used.

Pie-Plant Dumplings.—Strip the plant and cut it into pieces three or four inches long; make a plain pie crust, and roll enough of the pieces in the crust to make a dumpling about as large as an apple would make it. When you have as many dumplings as you think will suffice for your family, drop them into a pot of boiling water, and boil them about half an hour, when they are ready for the table. For a sauce to serve with them, use a cup of butter, a cup of molasses, and a cup and a half of sugar, boiled together. If boiled long enough it will be thick and rich without anything else added, but if in a hurry and can not wait for much boiling, thicken it with a tea-spoonful of flour mixed with sweet cream stirred into it.

Rice-Apple Dumplings.—Put your rice in a stew-pan, and pour on each cup of rice one gill of milk; stand it near the fire where it will keep hot but not boil. As soon as it has absorbed all the milk, pare your apples, take out the cores, and put the rice around them instead of paste. Boil them until the apples are soft. They should be tied in dumpling cloths.

Strawberry Dumplings.—Crust to be made the same as for short-cake; roll half an inch thick; put about a gill of strawberries for each dumpling. Bake, steam, or boil half an hour.

German Pudding.—One cup of milk, one cup of sugar, two eggs, one tea-spoonful of soda, two of cream of tartar, three table-spoonful of melted butter, flour to make it about as thick as cup-cake; bake about three-quarters of an hour; eat with melted sauce.

Graham Pudding.—Stir Graham flour gradually into boiling water with a little salt, and make about as thick as hasty pudding, or mush, and free from lumps. Eat with tolerably rich milk and sugar, and with the addition of canned peaches or other preserved fruits. If there be any of the pudding left over, it may be cut in slices and fried in lard or dripping, and is very good.

Green Corn Pudding.—Take four dozen ears of sweet green corn, says the author of *My Married Life at Hillside*, score the kernels lengthwise of the cob, and cut them from it. Scrape off what remains on the cob with a knife. Pound the corn cut off in a mortar. Add a pint and a half or one quart of milk, according to the youngness and juiciness of the corn. Add four eggs well beaten, a half tea-cup each of flour and butter, a table-spoonful of sugar, and salt sufficient to season it. Bake in a well-greased earthen dish, in a hot oven, two hours. Place it on the table browned and smoking hot, eat it with plenty of fresh butter, and be thankful.

Baked Indian Pudding.—Scald a quart of milk. Wet a tea-cup of Indian meal and three table-spoonful of wheat flour in cold milk; stir it into the boiling milk; then add a tea-cup of sugar or good syrup, a little chopped suet, a tea-spoonful of cinnamon, and a half tea-spoonful of salt. Pour the batter into a two-quart dish and fill up with cold milk. Mix, and bake slowly four or five hours. Skim-milk makes the best pudding.

Boiled or Steamed Indian Pudding.—In one quart of boiling milk, stir enough meal to make a stiff batter; add one cup of chopped suet, one egg, half a cup of syrup, a little salt, one cup of raisins, currants, or any kind of dried berries; boil in a bag two hours. Serve with wine sauce or cream.

Kentucky Ginger Pudding.—Three cups of molasses, one cup of butter, two tea-spoonful of saleratus, four eggs, four and a half cups of flour, ginger and nutmeg to suit. Steam or bake. To be eaten with any kind of nice sauce, and is good hot or cold.

Lemon Pudding.—Peel of three lemons grated, and juice of two, one pound of sifted white sugar, half a pound of melted butter, a pint of cream or milk, eight eggs, a gill of rose water, and bake until it is done.

Macaroni Pudding.—Simmer an ounce or two of macaroni in a pint of milk, and a bit of lemon and cinnamon till tender; put it into a dish with milk, two or three eggs (but only one

white), sugar, nutmeg, a spoonful of peach water, and half a glass of raisin wine. Bake with a paste round the edges. A layer of orange marmalade or raspberry jam in a macaroni pudding, for change, is a great improvement; in which case omit the almond-water ratafia, which you should otherwise flavor it with.

Minute Pudding.—Put a pint and half of fresh sweet milk on the fire; mix five large spoonsful of flour with half a pint of milk, a little salt and nutmeg. When the milk boils stir in the mixed flour and milk. Let the whole boil one minute, stirring constantly. Take it off the fire and let it set till lukewarm, then add three beaten eggs; put on the fire and stir till it thickens; take off when it boils. To be eaten with nice sauce.

Corn starch or ground rice, used instead of the flour, improve the character of the pudding.

Mush, or Hasty Pudding.—Wet up the Indian meal or samp in cold water till there are no lumps; stir it gradually into salted, boiling water, till it is so thick that the pudding-stick will stand in it; boil slowly, so as not to scorch, stirring often. Two or three hours boiling is necessary. Many persons fail in making good mush by not boiling it enough—when it is merely scalded it has a raw taste, and its rich starchy matter is not cooked out and blended in the pudding. When done pour into a deep, broad dish, and what is not used with milk may be cut, when cold, in slices half an inch thick, and fried on a griddle with a little lard, or baked in the stove oven.

Wheaten Grits Mush.—In a pot of boiling water place a vessel fitted with a tight cover, containing a quart of milk or water, and when it is brought to the boiling point stir in slowly about five table-spoonsful of the wheaten grits, and let it boil an hour and a half or two hours, stirring occasionally. By thus boiling it in a separate vessel, not in immediate contact with the fire, the risk of burning is obviated, without requiring constant stirring. Soaking the grits over night in the proper quantity of milk or water, and boiling as above, is considered a decided advantage. Serve with wine or other sauce, or sugar; dyspeptics, however, will probably find molasses the most wholesome condiment.

Oat Meal Mush.—The Scotch method of preparing oat meal is to make a very thin mush, a little thicker than gruel, and well salted. The water should be salted when the meal is stirred in, and the boiling should continue three to five minutes—not more—after the thickness is

finished. This, eaten with sugar and milk, with milk alone, or with syrup, is highly palatable, and is generally liked by children whose tastes are not vitiated by indulgence.

Graham Mush is made the same as minute pudding, only use water instead of milk. The longer it is cooked the better, if for one, two, or three hours.

Pine-Apple Pudding.—Peel the pine-apple, taking care to get all the specks out, and grate it. Take its weight in sugar, and half its weight in butter; rub these to a cream and stir them into the apple, then add five eggs and a cup of cream. It may be baked with or without the paste crust.

Plum Pudding.—Pick and stone half a pound of Malaga raisins; wash and dry the same quantity of currants; chop, not too fine, three-quarters of a pound of beef suet; put it in a convenient basin, with six ounces of sugar, two ounces of candied peel sliced, three ounces of flour, three ounces of bread crumbs, a little grated nutmeg, four eggs, a gill of water, or perhaps a little more, to form a nice consistence; butter a mold, put a piece of white paper over the top and round the sides, tie it in a cloth, boil for four hours in plenty of water; when done remove the cloth, turn it out of the mold, take the paper off the sides and top, and serve round with sweet sauce; it may also be boiled in a cloth.

An English Plum Pudding.—Beat eight eggs very light, add to them a pound of flour sifted and a pound of powdered sugar; when it looks quite light, put in a pound of suet finely shred, a pint of milk, a nutmeg grated, and a gill of brandy; mix with it a pound of currants, washed, picked, and dried, and a pound of raisins, stoned and floured. Tie it in a thick cloth and boil it steadily eight hours.

Sorosis Plum Pudding.—One cup of picked raisins, one cup of rich milk, one cup of molasses, three cups and a half of sifted flour, two tea-spoonsful of cream of tartar, one of soda, one of cinnamon, half a spoonful of salt. Boil four hours, or steam, until sufficiently cooked,

Pork Pudding.—One coffee-cupful of finely-chopped salt pork, two cups of water; add enough flour to mold it, roll thin, cut it so as to make two rolls; steam an hour and a half; eat with sauce, same as for apple dumplings. If you wish, spread with fruit before rolling up.

Queen of Puddings.—Into one quart of sweet milk put one pint of fine bread crumbs, butter the size of an egg, the grated rind of a fresh

lemon, the well-beaten yolks of five eggs; sweeten and flavor as for custard; mix the whole well together. While the above is baking, beat the whites of the five eggs to a stiff froth, and add a tea-cupful of powdered sugar; pour it over the hot pudding when cooked, return it to the oven, and bake to a delicate brown. Some prefer a layer of jelly, or canned peaches, or other fruit, over the pudding, before the frosting is added. Serve with cold cream. This is among the richest puddings known to the science of cookery, and is not only delicious, but light and digestible.

Rice Pudding.—Boil a cupful of rice in a small quantity of milk or water, till tender; when done it should be almost dry. Then add one cup of sugar, one cup of raisins previously boiled fifteen minutes, two eggs, and three pints of milk, with salt and spice to the taste.

Rice Cups.—One quart of milk, three table-spoonsful of rice flour, two ounces of butter. Put on your milk to boil; mix the rice flour very smooth, with some cold milk. As soon as the former begins to boil, stir in the latter, and let the whole boil twenty minutes. While the milk is warm, add the butter and a little salt. Rinse your custard cups with cold water. Half fill them with the mixture; when it becomes cold they turn out of the cups and retain their forms. They are very ornamental to the table. To be eaten with wine sauce or sugar and cream, flavored with a little nutmeg.

Rich Pudding.—One pint of flour, half a cup of sugar, three table-spoonsful of melted butter, half a pint of sweet milk, one egg, one tea-spoonful of soda, two tea-spoonsful of cream of tartar; stir well together. Place the above on a round tin and steam just one hour over a lively steam. Serve with the following sauce: Half a cup each of butter, sugar, and vinegar, half a pint of hot water; let it just come to a boil, remove from the fire, and stir in a well-beaten egg immediately. The above quantity will make a dessert sufficient for six persons.

Sago Pudding.—Take three tea-spoonsful of sago, and boil it in a pint of milk; mix three well-beaten eggs, sweeten and flavor to the taste. Line the dish with a rich paste, and bake slowly.

Squash Pudding.—Boil half a squash, good size, and sift through a sieve; add to it two table-spoonsful of butter, a cup and a half of white sugar, six eggs, a quart of milk, three table-spoonsful of rose water, one biscuit pound-very fine. Cover the bottom of your pud-

ding-dish with a nice paste, fill with the squash, and bake till done.

Suet Pudding.—One cup of finely-chopped suet, one of syrup, one of molasses, one of milk, sweet or sour, one of raisins or currants, three cups of flour, half a cup of butter, one tea-spoonful of salt, one tea-spoonful and a half of soda, spice and nutmeg. Boil four hours; tie up loosely. Wine sauce.

Sweet Potato Pudding.—Boil one pound of sweet potatoes very tender, and press them, while hot, through a grater—the finer the better. To this add half a dozen eggs, well beaten, three-quarters of a pound of fine sugar, three-quarters of a pound of butter, some grated nutmeg and lemon rind, and a glass of old brandy. Put a paste in the dish, and when the pudding is done sprinkle the top with white sugar, finely pulverized. This is a dish fit to grace the table of an epicure.

Tapioca Pudding.—Soak a tea-cup of tapioca in a quart of milk, over night—it will, if needed in a hurry, soak in two or three hours—the yolks of five eggs, a cup of sugar, a pint of cream or boiling milk, butter the size of a chestnut, a tea-spoonful of salt; rose water, lemon, or nutmeg for flavoring. Leave out two table-spoonsful of the sugar to beat with the whites of the eggs for a top to the pudding, after it has boiled as much as a soft custard. Flavor with vanilla. Brown it lightly in the oven. Serve cold.

Another: Put one tea-cup of tapioca to one quart of water, one hour, in a shallow dish. Then sweeten to taste and flavor with lemon. Have ready six large sour apples, pared and quartered, to be placed over the top of the dish, with the round sides up; sprinkle a little salt over them; bake until the apples are done; or, spread over the tapioca when done and cold a layer of tart stewed apples, properly seasoned and flavored. Eat with cream when cold.

Wheaten Grits Baked Pudding.—Boil a quart of milk or water, and stir in about five table-spoonsful of the grits—the thinner the mixture, without causing the mass to settle, the more palatable and easy of digestion. After sufficient boiling, let it stand to cool. While cooling, beat up well four eggs, with a half pound of sugar; then add a quart of milk, and mix thoroughly; after which stir these into the cooling mass, which should be only lukewarm, adding spices or fruit if you wish; and after thorough mixing of the ingredients, put into pans and bake.

Yorkshire Pudding with Roast Beef.—Five

table-spoonsful of flour mixed with one of salt, one pint of milk, and three well-beaten eggs. Butter a square pan and put the batter in it; set it in the oven until it rises, and is slightly crusted on the top; then place it under your beef, roasting before the fire, or in the oven, and baste it as you do your meat.

Other Relishes.—Pies and puddings have been largely treated; preserves, jams, jellies, and marmalades have been properly noticed in the chapter on Domestic Economy. A few other popular and desirable table desserts and relishes remain to be mentioned.

Baked Apples.—Take sour apples, those of a keen acid, and to every square tin filled with them, pour a tea-cup of water and one of sugar. Bake them slowly until done. Eat them with cream and the juice which cooks from them.

Another.—Apples or quinces, peeled and cored, with the hole made by coring filled with jelly or brown sugar, with thin bits of lemon peel, and baked with a little wine and sugar around them, are very nice; with a custard poured over and baked, they are termed a bird's nest.

Apple Float.—To one quart of apples, slightly stewed and well mashed, put the whites of three eggs, well beaten, and four heaping table-spoonsful of loaf sugar; beat them together for fifteen minutes, and eat with rich milk and nutmeg.

Apple Meringue.—Stew your fruit well done and smooth, sweeten to the taste, and add the rind of a lemon grated. Take the whites of five eggs, beat them to a stiff froth, put to them a tea-cup of powdered sugar, a little rose water, the juice of the lemon, or any other seasoning you prefer. Put your fruit in a flat dish, and with a spoon put the white of the egg on it, then set your dish in the oven and brown the egg; a few minutes will do it. A spoonful of butter stirred in the apples while hot is an improvement.

Apple Souffle.—Pare, core, and stew until tender, six large tart apples, press through a sieve, flavor and sweeten to the taste; then add while hot, the yolks of six eggs; beat up the whites with a cup of white sugar, and spread it over the apples. Eat cold with cream.

Charlotte Russe.—Make one pint of rich custard; when cold, stir in an ounce of isinglass dissolved in a half pint of water and reduced to a stiff jelly; sweeten with best sugar; mix a glass of wine, the juice of a couple of lemons, and a pint of frothed cream together; stir them into the custard when cool. Mold in blanc

mange molds, or cut out some nice shaped sponge cakes into shells, and pour the mixture in.

Cider or Wine Whey.—Boil a pint of new milk, add to it a glass or two of cider, put it over the fire until it just boils again, then set it aside until the curd settles; pour off the clean whey; sweeten to the taste. Wine whey is made the same as the above, substituting white wine for the cider.

Ice Cream.—One pint of cream, the yolks of six eggs, one-fourth pound of powdered white sugar—or, if cream can not be had, two pints of new milk, and one tea-spoonful of arrow-root mixed with the milk—when all are well incorporated, heat gently, using caution not to get too hot, and cool gradually. When wanted for the freezer, flavor with lemon, vanilla, pineapple, or strawberry, to the taste.

Cranberry Sauce.—This sauce is very simply made. A quart of cranberries are washed and stewed with sufficient water to cover them; when they burst, mix with them a pound of brown sugar, and stir them well. Before you remove them from the fire, all the berries should have burst. When cold, they will be jellied, and if thrown into a form while warm, will turn out whole.

Clouted Cream.—Take four quarts of new milk fresh from the cow, put it in a pan, and let it stand until the next day; then set it over a very slow fire for half an hour, making it nearly hot, then put it away until it is cold. Then take off the cream free from the milk, beat it smooth with a spoon. Sweeten to the taste and serve with preserves, berries, peaches, canned or freshly stewed fruit.

Or, mix together a gill of fresh milk, a wine-glass of rose water, and four ounces of white sugar; then add the yolks of two eggs well beaten; stir all into a quart of good cream, set it over hot coals, letting it just come to a boil, stirring all the time; take it off, and when cool enough, pour into a glass bowl and set it away to cool.

Cream Fritters.—A pretty dish for dessert may be made by rolling thin several layers of good cream dough, about the size of a breakfast plate, and frying in hot fat; place grated and seasoned apple between the several layers, and serve hot.

Lemon Cream.—Take a pint of thick cream and put it to the yolks of two eggs well beaten, four ounces of fine sugar, and the thin rind of a lemon; boil it up, then stir it till almost cold; put the juice of a lemon in a dish or bowl, and

put the cream upon it, stirring it till quite cold.

Pink Cream.—Take three gills currant or strawberry juice, half a pound of powdered white sugar, a pint and a half of thick cream—whisk it till well mixed. Serve it up in a glass dish, or freeze it if you like.

Raspberry Cream.—Rub a quart of raspberries through a sieve to take out the seeds, and then mix it well with some cream, and sweeten with sugar to your taste. Put it in a bowl and froth with a syllabub churn; take off the froth as it rises. When you have as much froth as you want, put the rest of the cream into a deep glass bowl or dish, and put the frothed cream on it, as high as it will stand.

Strawberry Cream.—Make it in the same way as raspberry cream. The coloring may be improved by using a little of the rose coloring for ice and jellies.

Tapioca Cream.—Dissolve two table-spoonsful of tapioca in cold water two hours—boil one quart of milk—add the tapioca, one cup of sugar, and the yolks of three eggs well beaten together. Let it boil until it thickens a little; turn it into a dish to serve. When cold, put over it an icing made of the whites of the eggs.

Whipped Cream.—Beat the whites of six eggs to a stiff froth, then stir in six large spoonsful of pulverized sugar, and one large spoonful of vanilla. Beat well together; then add one pint of thick sweet cream, put on a platter, and beat with a large spoon, unless you have a whisk. As the froth rises take it off, and put it in a bowl, glass, or cover jelly with it. If the weather is hot, it will be necessary to cool the cream by placing it on ice before attempting to beat it, or the froth will not rise.

Currant Juice, Iced.—Press the juice from ripe currants, strain it clear; to each pint of juice add a pound of loaf sugar and a pint of water, and freeze as for ice cream.

Custard Ice.—Beat the yolks of six eggs very light, and add six table-spoonsful of white sugar; stir these well; put over the fire one quart of new milk with a piece of vanilla bean; when it comes to a boil stir in with care the eggs and sugar; let it remain on the fire about one minute, stirring all the time to prevent curdling; then remove it and add one quart of good cream; take out the vanilla bean; when quite cold put it into the freezer and freeze. This is a nice dessert. It may be flavored with almond or any other flavoring, but that must be added after boiling, as all essences are liable to curdle the milk, unless pounded almonds are used,

which enriches the milk and is a very delicate flavor; cinnamon sticks flavor the milk pleasantly; they must be boiled in the milk and removed before freezing.

Custard.—Allow four eggs to each pint of fresh milk. Reserve part of the whites to froth and lay on top. Beat the eggs smooth, stir them in the milk—sweeten with the best loaf sugar. Set a bucket with the mixture in a pot of boiling water. Stir until done and remove from the fire instantly. The same mixture may be baked. A soft custard may be made in the same way by doubling the quantity of milk, and flavoring with lemon.

Almond Custard.—Blanch and beat a quarter of a pound of almonds very fine, and put them into a pint of cream, with two teaspoonsful of rose water, and sweeten as desired. Add the yolks of four well beaten eggs; stir all together one way over the fire until it is thick, and then pour into cups.

Apple Custard.—Take sweet apples that will cook; pare, cut, and stew them; when well done, stir till the pieces are broken, when cool, thin with milk to a proper consistency, and bake with one crust. Eggs may be prepared and added with milk, if desired. Sweetening is unnecessary.

Chocolate Custard.—Dissolve an ounce and a half of chocolate in a little water, add a pint of vanilla-flavored milk, with five well-beaten eggs, and two ounces of sugar.

Coffee Custard.—Four cups of boiled milk, one of very strong decoction of coffee, five yolks of eggs, two ounces of sugar; mix well and strain.

Lemon Custard is made by the addition of the juice and pulp of a lemon; and *vanilla* custard by the proper addition of that article, to the ordinary custard.

Floating Island.—Three pints of sweet milk and one of sweet cream, placed in a tin pail in a covered kettle of water; prepare the yolks of six eggs and the whites of three, with three tea-spoonsful of corn starch; rub the starch and eggs together, and add to the milk when it is scalding hot. A tea-cup of sugar should also be mixed with the egg. Let it boil not more than a minute, constantly stirring, which stirring should be continued until nearly cold. The remainder of the whites, if a custard is desired, may be beaten to a very stiff froth, and after scalding with boiling water, to prevent separation, placed upon the top, after the custard is put into a deep dish. Lemon peel, peach, or almond leaves, or a vanilla bean may

be scalded in the milk, unless extracts are preferred; vanilla gives it the ice-cream flavor.

Lemon Honeycomb.—Sweeten the juice of a lemon to taste, and pour it into the dish you serve it in; mix the white of an egg that is beaten with a pint of rich cream and a little sugar; whisk it, and as the froth rises put it on the lemon juice. Do it the day before you wish to use it.

Blanc Mange.—Dissolve an ounce and a half of gelatine in a pint of sweet cream. Sweeten, flavor, and boil it. Put a little in a cup on some ice and salt, and if it will mold, it is done.

Calves' Feet Mange.—Boil four feet in five quarts of water, without any salt. When the liquor is reduced to one quart, strain it, and mix with one quart of milk, and add several sticks of cinnamon or vanilla bean. Boil the whole ten minutes and sweeten it to the taste with white sugar; strain it and fill your molds with it.

Chocolate Mange.—Three ounces of French isinglass, dissolved in a very little cold water; put on a quart of new milk to boil, grate half a cake of vanilla chocolate and stir in the milk; then let it simmer five minutes; then pour into a mold, and when cold and jellyish, turn out and serve with cream.

Orange Ice.—Express the juice of six large oranges; strain, and add a quart of cold water, make it very sweet; beat the whites of four eggs to a stiff froth, pour the whole into a freezer properly prepared, and freeze immediately before it is wanted.

To Bake Pears.—Take half a dozen fine pears; peel, cut them in halves, and take out the cores; put them into a pan with half a pound of sugar and some water; set them in a moderate oven till tender, then put them on a slow fire to stew gently. Add grated lemon and more sugar, if necessary.

To Stew Pears.—Take six large, well ripe pears; cut each in two lengthways, peel them lightly, put them in a very clean stew-pan, cover with three ounces of white sugar powdered slightly; peel a lemon, cut the rind into small strips, press the juice on top of the sugar, gently shaking the pan to dissolve the sugar; then put it on a slow fire for ten or fifteen minutes; shake it gently once or twice, turn each piece with a fork, put it on the fire, and let it stew again for ten minutes. When done, put them on a dish to cool, then dress them on a flat dish; pour the syrup over and serve. They may also be done in a slow oven.

Raspberry or Strawberry Ice.—Mash a pint of fruit with two large spoonfuls of fine sugar; add a quart of cream, strain through a sieve, and freeze. If you have no cream, boil a spoonful of arrowroot or corn starch in a quart of milk and stir in a beaten egg, then add the fruit, strain, and freeze.

Snow Balls.—One cup of sugar, two eggs, four table-spoonfuls of milk, one tea-spoonful of cream of tartar, one of soda, if the milk is sour; spice to your taste; mix them hard enough to roll out, cut with a small cake cutter, and fry in hot lard; then dip them in the white of an egg, and roll in powdered loaf sugar till white.

Whipped Syllabub.—Stir into a quart of good cream one pound of crushed sugar, and a pint and a half of good wine; put these into a deep dish; squeeze in the juice of three fresh lemons, whip these half an hour, and as they froth lay the froth in a sieve until all is whipped; serve in lemonade glasses. Some use but half a pint of wine and six ounces of sugar, to a quart of cream or rich milk, with half the quantity of lemon.

Tea and Supper Dishes.—Under this head we group only a few appropriate dishes—muffins, griddle cakes, etc., have already been noticed.

Boiled Flour.—Stuff into a small well-sewed bag as much flour as it will hold, so that it shall be packed almost as hard as a stone. Tie securely, put it into a sauce-pan of boiling water and boil four hours, filling up the sauce-pan with more water as it boils away. Then take it up, peel off the skin, crack or break the ball of flour into pieces, roll it with a rolling-pin on a pasteboard, then sift it, and when it is cold, put into dry tins. It may be made as arrowroot custard, only it must be boiled. It is strengthening and very delicious.

Junket.—Take one quart of milk, warm from the cow, and stir in a tea-spoonful of rennet, and let it stand till curdled, which, if the rennet is of proper strength, will be in about fifteen minutes; grate over it a little nutmeg, and sweeten with maple molasses or honey. It is an excellent dish for supper.

Rice Tea Dishes.—When fruit is scarce, rice can be made a very pretty addition to the tea-table. Boil in the morning, and turn into buttered tea-cups; when cold, turn out the contents of the several cups on to a platter, make a little cavity in the top of each of these beautifully-shaped molds, placing a tea-spoonful of some

kind of jelly in the openings, and, with a pitcher of sweetened and flavored cream, you will have a fancy as well as nutritious dish. If more convenient, turn into a good-sized bowl, and you will have the same results with less trouble.

A beautiful dish can be arranged by putting cold rice on a plate with a layer of jelly, jam, grated apple, fresh strawberries, or raspberries on the top; then another layer of rice and fruit, and so on until you have the mound as high as you like, leaving the rice at the top, and being careful to trim the edges neatly, to show the stripes of fruit. This is delicious cold for tea, or baked half an hour for dessert with a good dressing.

Sandwiches for Tea or Evening Parties.—Chop some fine cold dressed ham, say about a quarter of a pound; put it in a basin with a table-spoonful of chopped pickles and a tea-spoonful of mustard, a little pepper or cayenne; put about six ounces of butter in a basin, and, with a spoon, stir it quickly till it forms a kind of cream, then add the ham and seasoning, mix all well, have the sandwich bread cut in thin slices; have already cut, thinly intermixed with fat, either cold roast beef, lamb, mutton, poultry, pheasant, grouse, partridge, etc., either of which lay evenly and not too thick, on your bread, season with a little salt and pepper; cover with another piece of bread; when your sandwich is ready cut tastily and serve. You may keep them in a cold place, if not wanted, as they will keep good under cover for twelve hours. Chopped tongue may be introduced instead of ham, in thin slices.

Apple Toast.—Cut six apples in quarters, take the core out, peel and cut them in slices; put in a sauce-pan an ounce of butter, then throw over the apples about two ounces of white powdered sugar and two table-spoonful of water; put the sauce-pan on the fire, let it stew quickly, toss them up or stir with a spoon; a few minutes will do them. When tender, cut two or three slices of bread half an inch thick, put in a frying-pan two ounces of butter and put on the fire; when the butter is melted, put in your bread, which fry of a nice yellowish color; when nice and crisp take them out, place them on a dish, a little sugar over, the apples about one inch thick; serve hot.

Broiled and Devilled Toast.—Toast a round of bread cut a quarter of an inch thick; mix in a plate one ounce of butter, half a tea-spoonful of cayenne, one tea-spoonful of mustard, one tea-spoonful of catsup; spread it over the toast,

and serve very hot. Broiled sausages may be served on it.

Cream Toast.—A good way to use up crust of dried bread, the "heels" of loaves and remnants, is to steam them in cream or milk, and turn a cup of melted butter over them. It makes a rich, palatable dish, if care is taken not to have them too moist.

Fruited Toast.—A very nice, light, and quick dish for supper, may be done as follows: Cut some nice slices of bread half an inch thick, dip them in milk which is sweetened, or sprinkle sugar over, then dip it into some batter of milk and flour, and fry nicely, or put some butter in a tin dish, bread over, and put in an oven. When quite hot and nearly hard, put some fruit over, and serve.

Ham Toast.—Melt a small piece of butter in a stew-pan until it is slightly browned; beat up one egg and add to it; put in as much finely-minced ham as would cover a round of buttered toast, adding as much gravy as will make it moist when quite hot. When all the ingredients are in, stir them quickly with a fork; pour on to the buttered toast, which cut in pieces afterward any shape you please; serve hot.

Toast and Cheese.—Cut a slice of bread half an inch thick, pare off the crust, and toast it very slightly on one side. Cut a slice of cheese a quarter of an inch thick—not so big as the bread by half an inch on each side—pare off the rind, lay it on the toasted bread, place on a flat tin plate and put in the oven for ten minutes or so. Mix a quarter of a tea-spoonful of salt and mustard, and a sprinkle of pepper, stir into the cheese, and you will have a delicious luncheon.

Welsh Rarebit.—Take a quarter of a pound of good fresh cheese—a solid piece the size of a large tea-cup—cut it up in small thin slices, and put in a frying-pan, with a little over a cupful of sweet milk. (Some add a glass each of wine and ale.) Have previously beaten an egg and stir that in, then add half a salt-spoon of dry mustard, two dashes of red pepper, and a small piece of butter, stirring the mixture all the time. Have ready rolled three small or two large crackers, and gradually stir them in; as soon as this is thoroughly incorporated, turn the mixture out into a heated dish and cover it.

Cooking for the Nursery.—A selection of the more important articles of diet for the nursery—for children and invalids—is here presented. Graham bread, cakes, gems, toast, etc., have been already given.

Children's Diet.—"The intelligent and experienced mother or nurse chooses for the child," says LIEBIG, "with attention to the laws of nature; she gives him chiefly milk and farinaceous food, always adding fruits to the latter; she prefers the flesh of adult animals, which are rich in bone earth, to that of young animals, and always accompanies it with garden vegetables; she gives the child especially bones to gnaw, and excludes from its diet veal, fish, and potatoes; to the excitable child of weak digestive powers, she gives, in its farinaceous food, infusion of malt, and uses milk and sugar, the respiratory matter prepared by nature herself for the respiratory process, in preference to cane sugar, and she allows him the unlimited use of salt."

Arrowroot Pap.—Take a dessert-spoonful of arrowroot, and stir carefully into a cup of cold milk; then pour it into a pint of boiling milk, and stir constantly until cooked; then remove it from the fire, and, while cooling, sweeten to the taste.

Barley Gruel for Infants.—Mix a table-spoonful of barley flour with a table-spoonful of milk, gradually adding a quart of boiling milk; boil it gently for ten minutes; when cold strain through a muslin, and sweeten with loaf sugar. It is a very nutritious and cooling food for infants.

Beef Essence.—In low fevers and other forms of exhausted vitality, attended with cerebral weakness, produced by severe labor or other cause, there is no article of food which can replace beef essence; and every housewife should know how to make it properly. To do so, take a pound of juicy beef (the neck is, perhaps, the best), cut it very fine, rejecting all fat and "gristle," and put it into a wide-mouthed bottle, such as a pickle bottle. Then put the bottle, tightly-corked, into a kettle of cold water, set it over the fire, and boil an hour. When well boiled uncork the bottle, pour its contents into a strainer, and drain out the liquid.

A pinch of salt may be added, if required, to render it palatable. No water should be added to the meat or essence. Even a tea-spoonful of this preparation contains a great deal of nourishment, and is borne by almost all stomachs. Life can be sustained by its use a long time.

Another mode of preparing an invaluable beef stimulant: Chop up lean beef, place it in a pan, and subject it, for an hour or more, to heat, by keeping the pan in a vessel of boiling water; the fat, fiber, and essence will distinctly separate. Strain the liquid portions from the

fiber, and remove from it the fat, by means of blotting-paper. A highly aromatic, amber-colored liquid, of an agreeable flavor, will remain. This is the required stimulant. Unlike common beef tea, its effect is stimulant, rather than nutritious—rapidly exerting a stimulating power over the brain.

Beef Tea, or Mutton Broth.—To make beef tea, mutton broth, and other meat soups, the flesh should be put into cold water, and this afterward very slowly warmed, and finally boiled. A lean, juicy piece of beef is best, cut in thin slices—a pound to a quart of water; twenty minutes cooking after it commences to boil. Season with salt and mace. A little rice or vermicelli may be added, if desired.

Beef Toast.—Take pieces of cooked beef left at table, chop fine; put in a stew-pan or spider with a pint of water, and butter, salt, and pepper; and let it stew a few minutes. Put slices of hot toasted bread into a dish and cover with the meat and gravy, then more toast, and so on till it is all used up or your dish is full. Serve hot.

Boiled Flour Gruel.—Boil a pound of flour in a linen cloth—first frequently dipping it in cold water, and dredging the outside with flour till a crust is formed around it, which will prevent the water from soaking into it while boiling. Boil it till it becomes a hard, dry mass. Two or three spoonfuls of this may be grated and prepared in the same manner as arrowroot gruel, for which it is an excellent substitute.

Chicken Broth.—Take one-half of a carefully-dressed chicken, and pour on it one quart of cold water; add a little salt and a tea-spoonful of rice; boil very slowly for two hours in a tightly-covered vessel; skim occasionally, and season very little.

Drinks for the Sick—Apple Water.—Roast three or four good apples carefully, preserving all the juice. Put them in a pitcher, and pour on a quart of boiling water. Drink when cold.

Barley Water.—Wash two table-spoonfuls of pearl barley, and add a quart of water and a little salt. Simmer slowly for an hour. Half a cup of raisins makes it richer. When cool, put in lemon juice and sugar.

Flaxseed Tea.—Take of flaxseed, one ounce; white sugar, one and a half ounces; lemon-juice, two table-spoonfuls; boiling water, two pints. Infuse them in a pitcher some hours, and then strain off the liquor. An ounce of liquorice, shaved, may sometimes be used, instead of sugar.

Lemon Water.—Put two slices of lemon, thinly pared, into a tea-pot, a small bit of the peel, and a bit of sugar. Pour in a pint of boiling water, and cover it close two hours.

Pectoral Drink.—Take of common barley and stoned raisins, each, two ounces; liquorice root, half an ounce; water, two quarts. Boil the water first with the barley, then add the raisins, and afterward, near the latter end of the boiling, the liquorice. The decoction then will be fully completed, when one quart only will be left after straining.

Tamarind Drink.—Boil two ounces of the pulp of tamarinds in a quart of milk—or dissolve that quantity of pulp in a quart of warm water. Strain, and use when cold as a refrigerant drink.

Toast Water.—Two slices of stale bread, toasted a nice brown; pour over a pint of water and a few spoonfuls of good vinegar. Add sugar and nutmegs if liked. Some omit the vinegar, sugar, and nutmegs.

Indian Meal Gruel.—Boil a pint of water in a sauce-pan; mix two spoonfuls of Indian meal in a little cold water, and stir into the boiling water; season it with salt and boil fifteen minutes; stir it frequently. Some add a cup of milk or a glass of white wine, a little sugar, and a little nutmeg.

Oat Meal as Food For Children.—If mothers would have their children grow up clear-eyed and comely, with frames of bone and not of cartilage, with transparent complexions instead of muddy ones, with full and well-rounded limbs instead of scrawny ones, then do not always set before them bread of fine flour and highly seasoned meats, but give them four or five times a week a breakfast of oat meal mush. Do you say that they do not like it? Perhaps you do not know how to prepare it properly. The Scotch method for preparing oat meal (or rather one of the methods) is to make a thin mush, a little thicker than gruel, and the boiling should continue three or five minutes (not more) after the thickening is finished. This, eaten with sugar or milk alone, or with syrup, is highly palatable, and is generally liked by children whose tastes are not vitiated.

Oat Meal Gruel.—Put a cup of raisins in a quart of water and boil hard for half an hour. Mix two table-spoonfuls of oat meal with a little cold water and salt, and stir it in with the raisins. Let it boil up and skim it well. Sweeten with white sugar and add a little nutmeg. This is very nourishing.

Oat Porridge.—Stir some oat meal and water

together; let the mixture stand to clear, and pour off the water. Then put more water to the meal, stir it well, and let it stand till next day. Strain through a fine sieve, and boil the water, adding milk while so doing. The proportion of water must be small. With toast, this is a good preparation for weak persons.

Orange Whey.—Milk, one pint; the juice of an orange, with a portion of the peel. Boil the milk, then add the orange and let it stand till coagulation takes place. Strain.

Panada.—Set a pint of water on the stove and add a little sugar, nutmeg, and lemon. Crumb up some stale white bread, and as soon as the water boils stir in the bread; let it boil fast a few minutes. Add a small bit of butter if allowable.

Rice.—Rice is invaluable in sickness; especially in cases of indigestion and bowel difficulty. Cooked simply with considerable nutmeg, it becomes a powerful astringent. This should be borne in mind by those who are dreading cholera.

Rice Jelly.—Boil a quarter of a pound of rice flour with half a pound of loaf sugar in a quart of water, till the whole becomes one glutinous mass, then strain off the jelly and let it stand to cool. This food is very nourishing and beneficial to invalids.

Rice Milk.—This dish is an excellent one, and very simply and quickly made. After washing a pint of rice in two different waters, boil it well with about half a pound of raisins from which the stems have been carefully picked. Pour off the water and mix a quart of rich milk with the rice. Let it boil for about five minutes, and after mixing with it four table-spoonfuls of brown sugar, beat two eggs until they are light and pour them into the milk, stirring it all the time. After the rice and eggs are well mixed together, they should boil from three to five minutes. If they are not well stirred, the eggs will form a custard on the surface, which is not desirable.

Ground Rice Milk.—Boil one spoonful of good rice, rubbed down smooth, with a pint and a half of milk, a little cinnamon, lemon peel, and nutmeg. Sweeten when nearly done.

Sago Cream.—This is a very grateful article of food to the sick, and is thus made: One dessert-spoonful of good sago, to be boiled in pure water until it is a jelly. Then add a cup of sweet cream, and boil again. Beat up a fresh egg quite light, and pour the sago on while hot. Sweeten and spice, with sugar and nutmeg, to your taste.

Sago Jelly.—Take of sago, washed well, one large spoonful, and water nearly a pint. Boil them gently, stirring often until the mixture is smooth and thick; then add two spoonsful of wine, a little nutmeg, and sweeten it to the taste. A piece of lemon peel added to it when boiling, gives it a pleasant taste and flavor, and with some patients it agrees better when boiled in milk, for debility.

Soup for Infants.—LIEBIG recommends soup for infants, which he believes superior to cow's milk, in cases where children must be reared "by hand," prepared as follows: Half an ounce of wheaten flour and an equal quantity of malt flour, seven grains and a quarter of bicarbonate of potash, and one ounce of water, to be well mixed. Five ounces of cow's milk are then to be added, and the whole put on a gentle fire; when the mixture begins to thicken it is removed from the fire, stirred during five minutes, heated and stirred again until it becomes fluid, and finally made to boil. After the separation of the bran by a sieve, it is ready for use. After boiling for a few minutes, it loses all taste of the flour.

Vegetable Soup.—Take one turnip, one potato, and one onion; let them be sliced and boiled in one quart of water for an hour. Add as much salt as is agreeable, and pour the whole upon a piece of dry toast. This forms an agreeable substitute for animal food, and may be given when the latter is inadmissible.

The Art of Carving.—The dinner-table is the test of enlightenment. The savage snatches his food and devours it like a tiger; but civilized man, according to the thoroughness of his civilization, cooks it with care, prepares it with skill, and partakes of it with grace and deliberateness. Perhaps it is EMERSON who says, "I had rather my next neighbor at dinner should be a thief than a boor." This may seem to be extreme sensibility; but we all feel that the cultivation of table manners is shockingly neglected in America; and that it is scarcely possible to urge its necessity with too much emphasis. And good table manners are shown, not only in eating properly, but in serving others gracefully.

We eat far more meat, *per capita*, in this country than in any other; so the simple art of carving becomes almost indispensable here. Yet, in this department of life, as in many others, precipitation is the rule, and, violating at once the law of digestion and the law of

politeness, people forget the proper way in a headlong scramble for a dinner.

One of the most important accomplishments for a gentleman to acquire, whether he be the head of a family or a bachelor, is the ability to carve all meats well—that is, economically and elegantly. To learn this is not difficult, and it saves much needless waste and frequent mortification. The necessity of promiscuous carving is being abolished at some tables, by the substitution of the fashion of cutting up the meats before bringing them in; but in the homes of middle life, skill in the use of a carving knife is still a most desirable acquirement. Indeed, any gentleman who is a diner-out is liable to be summoned to carve, under circumstances which will not permit him to decline; and if he be ignorant of the art, he may well regard himself as in constant peril.

He may happen to be on the right hand of the lady of the house, and at her request very politely conveyed, he can not refuse; he rises, therefore, to his task as though one of the labors of Hercules had been suddenly imposed on him; he first casts around him a nervous glance to ascertain whether any one else is carving a fowl, in order to see where they insert their fork, at what part they commence, and how they go on; but it generally happens that he is not so fortunate as he desires, and therefore he is left to get through the operation as well as he can. He takes up his knife and fork desperately; he knows that a wing is good, a slice of the breast is a dainty, and that a leg is a gentleman's portion, so he sticks his fork in at random, and slashes at the wing, misses the joint, and endeavors to cut through the bone—it is not an easy task; he mutters something about his knife not being sharp, essays a grin and a faint *jeu de mot* at the expense of the fowl's age, and finding the bone will not sunder by fair means, he puts out his strength, gets off the wing with a sudden dash which propels the mangled member off the dish upon the cloth, sends the body of the fowl quite to the edge of the dish, and with the jerk splashes a quantity of gravy over the rich dinner-dress of the lady seated next to him, much to her chagrin at the injury to her robe, and her contempt for the barbarous ignorance he has displayed. He has to make a thousand apologies for his stupidity, which only serve to make his deficiency more apparent; he becomes heated, suffused with blushes and perspiration—continues hacking and mangling the fowl until he has disjoined

the wings and legs, and then, alas! the body presents itself to him as a *terra incognita*; what to do with it, he is at a complete loss to imagine—but it must be carved—he has strength of wrist, and he crashes through it at the hazard of repeating the mishaps he commenced with. His task over, he sits down confused and uncomfortable, to find his efforts have caused the rejection of any portion of the fowl he has wrenched asunder by those who have witnessed his bungling attempt; he is disgusted with the fowl, himself, carving, and everything else—loses all enjoyment for his dinner, and during the remainder of the evening can not recover his equilibrium.

A blunderer will not wholly save his composure by attempting to conceal his awkwardness with humor; like the carver who, having flouted a fowl in a lady's lap, said, coolly, "Madam, may I trouble you to pass that chicken?"

He will possibly too have the very questionable satisfaction of witnessing an accomplished carver dissect a fowl; he perceives with a species of wonder that he retains his seat, plants his fork in the bird, removes the wings and legs as, if by magic, then follows merry-thought and neck bones, then the breast—away come the two sides-men, and the bird is dissected; all this too is accomplished without effort and with an elegance of manner as surprising as captivating; the pieces carved look quite tempting, while there is no perceptible difference in the temperature of the carver; he is as cool and collected as ever, and assists the portions he has carved with as much grace as he displayed in carving the fowl. The truth is, he is acquainted with the anatomy of the bird; he has felt the necessity of acquiring the art, and has taken advantage of every opportunity which has enabled him to perfect himself in the requisite knowledge to attain the position at which he has arrived.

Manual skill, rather than muscular strength, is the secret of the art. A delicate lady can carve as successfully as a strong man, if she knows how. All displays of exertion are in very bad taste. A carver's seat should be a little higher than other chairs, and he should remember that his place is in it. It is now considered impolite to carve standing. The carver should be seated so near the dish as not to require effort in reaching; and should wield, with the greatest facility, a keen blade.

Carving knives should "be put in edge" before the dinner commences, for nothing irritates

a good carver, or perplexes a bad one, more than a knife which refuses to perform its office; and there is nothing more annoying to the company than too see the carving knife dancing to and fro over the steel, while the dinner is getting cold, and their appetites are being exhausted by delay.

It is best for the carver to supply the plates, and let the waiter hand them around, instead of putting the question to each guest as to which part he prefers, and then striving to serve him with it, to the prejudice of others present. Indeed, this asking for individual preferences is not now practiced. Ladies should be assisted before gentlemen. Waiters should present dishes on the left hand; so that the diner may assist himself with his right.

Fish is served with a fish-slice, or the new fish-knife and fork, and requires very little carving, care being required, however, not to break the flakes, which, from their size add much to the beauty of cod and salmon. Serve part of the roe, milt, or liver, to each person. The heads of cod and salmon, and sounds of cod, are likewise considered delicacies.

Poultry.—To carve poultry well requires skill, personal ease, and grace, and a knowledge of its anatomy, so as to obtain the largest quantity of meat. To carve a turkey without withdrawing the fork, stick the fork firmly across



the breast-bone, so as to have the turkey at perfect command. In this way it is easy to complete the entire carving without extracting the fork till done. Begin by cutting slices from each side of the breast, in the direction of the lines from A to B in the engraving. These should be piled neatly aside. Next (or some will say first) cut off the legs, passing the knife between them and the body, then making a gash to the joint of the hip, turn the leg off, and it will part readily. Separate the drumsticks. Here an instrument termed a disjoiner will be found serviceable. The wings and contiguous portions are then removed by "a twist of the wrist"—and these are always a delicacy. Then pass the knife straight down through the breast to the bone and turn off toward the neck; this will uncover the stuffing, and enable you to take away the shoulder-bones, by loosening from the back, and to remove the neck.

Lay the turkey on his side, and cut down the ribs, separating the back from the breast. Now, for the first time, remove the fork, lay the back up, rest the knife across the center, and break the joint by bending up the lower end with the fork. Then you will find it easy to divide the lower half twice lengthwise, and the dissection is accomplished. The stuffing, of truffles or whatever it is, can be found under the apron, at C.

The leg, or drum-stick as it is called, is too tough and stringy to put on any guest's plate; but a good cut can be taken from the outside, and the bone be retained on the dish. The breast is most preferred; so that it is ill-bred for any person to ask for that part exclusively, and is regarded as discourteous to omit putting some of it on each plate.

The boiled turkey is carved like the roast turkey, except that it requires a little more skill in withdrawing the legs from the body and separating them.

To carve a roast fowl is a nice operation—it requires both observation and practice. Insert the knife between the legs and the side, press back the leg with the blade of the knife, and the joint will disclose itself; if young, it will thereupon separate; in any case, a little judicious management will remove it. Proceed as with roast turkey.

But in the case of "spring chickens" it is better to cut the breast-bone lengthwise into three pieces. If you attempt to cut slices from the breast of small, young chickens, they are but shreds; no one is well served, and the skeleton is left on the dish; whereas, if you separate the whole breast into three, bones and all; then, with the two wings and the collar-bones, you have six handsome pieces of the white meat; make as many of the dark part, and put a piece of each kind on every plate; then you will have made the most of it, and have but the neck left on the dish.

Boiled fowl, geese, and ducks are similarly disposed of; the hand that can carve a fowl and turkey well, will find no embarrassment with either of the winged domestics.

Small Game.—To carve a partridge, separate the legs, and then divide the bird into three parts, leaving each leg and wing together. The breast is then divided from the back, and helped whole, the latter being assisted with any of the other parts. When the party consists



entirely of gentlemen, the bird is divided into

two by cutting right through from the vent to the neck.

The pheasant is carved nearly like a fowl; the breast is first in general estimation, then the wings, and after these the merry-thought; lovers of game prefer a leg.

Snipe, woodcock, and pigeon are cut in half, down the breast and back, and one-half helped at a time.

Grouse and plover are carved according to directions given for partridges.

Quails, larks, and all small birds are served whole.

Roast Pig.—The cook should send a roast pig to table as displayed here, garnished with



ROAST PIG.

head and ears; carve the joints in the direction shown by the lines in the diagram, then divide the ribs. Serve with plenty of sauce; should one of the joints be too much, it may be separated; bread sauce and stuffing should accompany it. An ear and the jaw are favorite parts with many people.

Calf's Head.—There is much more meat to be obtained from a calf's head by carving it



HALF OF CALF'S HEAD.

one way than another. Carve from A to B, cutting quite down to the bone. At the fleshy part of the neck end you will find the throat sweetbread, which you can help a slice of with the other part; you will remove the eye with the point of the knife and divide it in half, helping those to it who profess a preference for it; there are some tasty, gelatinous pieces around it which are palatable. Remove the jaw-bone, and then you will meet with some fine-flavored lean; the palate, which is under the head, is, by some, thought a dainty, and should be proffered when carving.

Cod's Head and Shoulders.—Carry the trowel

from A to B, and then along the line to C; help slices accompanied by some of the sound, which is to be found lining the back, and



COD'S HEAD.

which you may obtain by passing the trowel under the backbone at C; serve also a piece of liver. Many choice parts lie in this dish, and by inquiry you will soon ascertain the parts preferred. The jaw-bone, from its gelatinous nature, is considered by some a dainty, and the head generally, including eyes and palate, is a favorite with many.

Round of Beef.—Cut off and lay aside a thick slice from the entire surface, then help. There are two kinds of fat attached to this joint, and



ROUND OF BEEF.

as tastes differ, it is necessary to learn which is preferred; the solid fat will be found at C, and must be cut horizontally; the softer, which resembles marrow, at the back of the bone, below D. Carve a fillet of veal similarly.

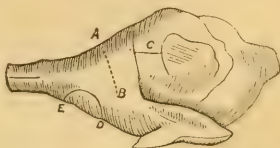


SIRLOIN OF BEEF.

Sirloin of Beef.—The under part should be first served and carved as indicated in the engraving, across the bone. In carving the upper part, the same directions should be followed as for the ribs, carving either side, or in the center, from A to B, and helping the fat from D.

Leg of Mutton.—The choicest part lies near

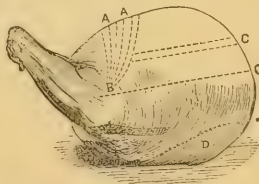
A, midway between the knuckle and the other end. Thence, cut thin slices each way, as deep as B. The outside being seldom very fat, some



LEG OF MUTTON.

favorite pieces may be sliced off the broad end at C. The knuckle is tender, but the other parts more juicy. Some good slices may be cut lengthwise, from the broad end of the back of the leg. The cramp-bone is much thought of by some to get it, cut down to the bone at D, and in the curve line to E.

Shoulder of Mutton.—This is a joint which some epicures despise, but which is a favorite part with others. There are certainly some succulent titbits in the shoulder, and in serving



SHOULDER OF MUTTON.

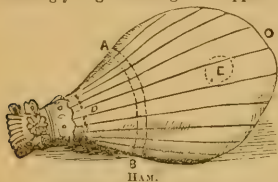
it, the tastes of those at table should be consulted. It should be served and eaten very hot. It is sent to table lying on the dish as shown in the engraving. Commence carving from A to B, taking out moderately thin slices in the shape of a wedge; some nice pieces may then be helped from the blade-bone, from C to B, cutting on both sides of the bone. Cut the fat from D, carving it in thin slices. Some of the most delicate parts, however, lie on the under part of the shoulder; take off thin pieces horizontally from B to C, and from A; some tender slices are to be met with at D, but they must be cut through as indicated.

Quarter of Lamb.—Lay the knife flat, and cut off the shoulder. The proper point for incision will be indicated by the position of the shoulder. A little lemon juice may be squeezed over the divided part, and a little cayenne pepper, and the shoulder transferred to another dish, for the opposite end of the table. Next, separate the brisket, or short bones, by cutting length

wise along the breast. Then serve from either part as desired.

Loin of Mutton.—If small, this should be carved in chops, beginning with the outer chop—if large, carve slices the whole length. A neat way is to run the knife along the chine-bone, and under the meat along the ribs; it may then be cut in slices; by this process fat and lean are served together. Your knife should be sharp, and it should be done cleverly.

Ham.—There are three ways of carving a ham; 1, carve from A to B, cutting thin slices—cut slantingly to give an edge-like appearance;



or, 2, cut at D, in the same direction as from A to B, then carve from D to C, in thin slices, as indicated in the diagram; or, 3, cut a smooth, round hole, as at E, taking thin, circular pieces.

Spare-Rib of Pork is carved by separating the chops, which should previously have been jointed. Cut as far as the joint, then return the knife to the point of the bones, and press over to disclose the joint, which may then be relieved with the point of the knife. If a whole rib is too much, a slice of meat may be taken from between two ribs.

A Tongue.—The best slices are midway between the root and tip of the tongue. On this account, to avoid partiality, it is becoming the custom with some to slice the tongue very thin from root to tip, and roll up each slice for a plate. But it is still the more general practice to cut the tongue through, or nearly through, slicing thin, and adding from the fat and kernels to those who desire.

Eels.—Cut into pieces through the bone; the middle slices are the most savory bits.

Soup.—Pour but one ladleful into each plate. In helping any one to gravy, or to melted butter, do not pour it *over* their meat, fowl, or fish, but put it to one side, on a vacant part of the plate, that they may use just as much of it as they like. In filling a plate, never heap one thing on another.

FAMILY HEALTH:

CAUSES OF SICKNESS AND CONDITIONS OF RECOVERY—PREVENTIVES AND MEDICINES.

HEAVEN never granted a richer boon than health; and without it, all other blessings are comparatively valueless. Yet it is often lightly esteemed and carelessly thrown away, and never fully appreciated until it is gone. We have seen the mistress of a splendid mansion, surrounded by every luxury which wealth could command, lying upon her couch, pale and miserable, fretful and unhappy. Within her reach were the most delicate viands and exquisite fruits, yet she could partake of none. Health was no longer hers. She had parted with it for the sake of gratifying her vanity, by wearing thin shoes to display the beauty of her foot, and now, when consumption was preying upon her, she repented her folly, but it was too late; and though she would willingly give all that she possessed, the priceless treasure could not be recalled.

The thin, ghastly-looking gentleman, who reclines in his luxurious easy chair, with his gouty foot upon a pillow, sighs and groans in anguish, and thinks of the many weary nights of pain, when the bed of down and the silken covering could bring him no repose. How he envies the plow-boy, who whistles on the green fields, whose step is elastic, and whose heart is light and gay at his toil, while his sleep is sound and refreshing!

What is wealth to the invalid but a bitter mockery which can yield no happiness?

Take, for example, says Miss SEDGWICK, a young girl bred delicately in town, shut up in a nursery in her childhood—in a boarding-school through her youth, never accustomed either to air or exercise, two things that the law of GOD makes essential to health. She marries; her strength is inadequate to the demands upon it. Her beauty fades early. She languishes through the hard office of giving birth to children, suckling, and watching over them, and dies early; and her acquaintance,

lamenting, exclaim: "What a strange Providence, that a mother should be taken in the midst of life from her children!" Was it Providence? No! Providence had assigned her three score and ten; a term long enough to rear her children; but she did not obey the laws on which life depends, and of course she lost it. A father, too, is cut off in the midst of his days. He is a useful and distinguished citizen, and eminent in his profession. A general buzz raises on every side, of, "What a striking Providence!" This man has been in the habit of studying half the night, of passing his days in his office and in the courts, of eating luxurious dinners, and drinking various wines. He has every day violated the laws on which health depends. Did Providence cut him off? The evil rarely ends here. The diseases of a father are often transmitted; and a feeble mother rarely leaves behind her vigorous children.

"What a Providence!" exclaims the world, "cut off in the midst of happiness and hope!" Alas! did she not cut the thread of life herself? A girl in the country, exposed to our changeful climate, gets a new bonnet, instead of getting a flannel garment. A rheumatism is the consequence. Should the girl sit down tranquilly with the idea that Providence has sent the rheumatism upon her, or should she charge it on her vanity, and avoid the folly in the future! Look, my young friends, at the mass of diseases that are incurred by intemperance in eating or in drinking, or in study, or in business, by neglect of exercise, tight lacing, etc., and all is quietly imputed to Providence! Is there not impiety as well as ignorance in this?

In our civilized, sedentary life, he who would have good health must fight for it. Many people have the insolence to become parents who have no right to aspire to that dignity. Civilized man has learned the trick of heading off

some of the diseases that used to sweep over whole regions of the earth, and lay low the weakliest tenth of the population. Consequently, while the average duration of human life has been increased, the average tone of human health has been lowered. Fewer die, and fewer are quite well. Very many of us breathe vitiated air, and keep nine-tenths of the body quiescent for twenty-two or twenty-three hours out of every twenty-four. Immense numbers cherish gloomy, depressing opinions, and convert the day set apart for rest and recreation into one which aggravates some of the worst tendencies of the week, and counteracts none of them. Half the population of the United States violate the law of nature every time they take sustenance; and many children go crammed with indigestion, to sit six hours in hot, ill-ventilated, or unventilated school rooms. Except in a few large towns, the bread and meat are almost universally inferior or bad; and the only viands that are palatable are those which ought not to be eaten at all. At most family tables, after a course of meat which has the curious property of being both soft and tough, a wild profusion of ingenious puddings, pies, and cakes, and other abominable trash, beguiles the young, disgusts the mature, and injures all. From bodies thus imperfectly nourished, we demand excessive exertions of all kinds.

Beauty has its foundation in physical well-being. Health has its laws, which must be understood and obeyed; and these laws are clearly indicated in our physical and mental constitutions. They demand:

1. Proper food and drink, in such quantities as the system is capable of readily assimilating.
2. Air and sunlight in abundance.
3. Sufficient exercise, rest, and sleep.
4. An agreeable temperature.
5. Perfect cleanliness.

Rules for the Preservation of Health.

—In order to secure good health, first study to acquire a composure of mind and body. Avoid agitation or hurry of one or the other, especially just before and after meals, and while the process of digestion is going on. To this end, govern your temper, endeavor to look at the bright side of things, keep down, as much as possible, the unruly passions; discard envy, hatred, and malice, and lay your head upon your pillow in charity with all mankind. Let not your wants outrun your means. Whatever difficulties you have to encounter, be not

perplexed, but only think what it is right to do in the sight of Him who seeth all things, and bear, without repining, the result. When your meals are solitary, let your thoughts be cheerful; when they are social, which is better; avoid disputes, or serious argument, or unpleasant topics. "Unquiet meals," says SHAKESPEARE, "make ill digestion;" and the contrary is produced by easy conversation, a pleasant project, welcome news, or a lively companion. Wives are recommended not to entertain their husbands with domestic grievances about children or servants at this time, nor to ask for money, nor produce unpaid bills, nor propound unreasonable questions; and we advise husbands to keep the cares and vexations of the world to themselves, but to be communicative of whatever is comfortable, and cheerful, and amusing.

"Always keep the head cool, and the feet warm." Go to bed early and get up at the peep of day. Take no supper, or if any, a very slight one. The hour before bed-time should be spent in agreeable relaxation, or in such exercises only as tend to compose the mind and promote inward peace and cheerfulness.

Never be in a hurry when you eat, but masticate your food well, and thoroughly mix it with the saliva of the mouth before swallowing, which is one-half the process of digestion. Above all, never wash your food down half masticated with a pint or more of tea or coffee. Too much fluid on the stomach dilutes the gastric juice, prevents its direct and immediate action on the food, and, consequently, retards the process of digestion till the fluids have been absorbed. Drink very moderately with your meals, and nothing for two and a half or three hours afterward. Avoid too much greasy and fatty substances. The too common practice of eating fat pork is the cause of more scrofula than all other causes combined. Fresh bread and hot biscuits are decidedly injurious, and unfit to be eaten. Eat regularly and never between meals.

The quantity of food should be proportioned to the amount of exercise a person undergoes. Sedentary people should be rather abstemious; their food should be nutritious, easy of digestion, and moderate in quantity.

Refrain from both mental and bodily exertion for a short time after the principal meal. If immediate exertion be required, only a slight repast should be taken instead of the usual meal. Never eat a full meal when the body is heated or much fatigued with exercise. Wait till you are somewhat refreshed by a short

interval of repose. If faint, a little soup may be safely taken meanwhile. Practice occasional abstinence. Whenever the system is enfeebled or disordered, diminish the quantity of food, and allow more time for exercise. In cases of slight indisposition, a partial or a total fast will often be found the best restorative.

Be very sparing in the use of alcoholic stimulants. They may sometimes be employed in cases of debility or extraordinary labor; but, under any circumstances, if freely or frequently indulged in, they will most certainly impair your health, and shorten your life.

Practice habitual cheerfulness and composure of mind, arising from peace of conscience, constant reliance on the goodness of God, and the exercise of kindly feelings toward men. Peace of mind is as essential to health as it is to happiness.

Exercise strict control over the appetites and passions, with a fixed abhorrence of all excess and all unlawful gratifications whatsoever. He that would enjoy good health must be "temperate in all things," and habitually exercise the most rigid self-government; for every sort of vicious indulgence is highly injurious to health; first, *directly*, in its immediate effects on the body; and next, *indirectly*, in the perpetual dissatisfaction and anxiety of mind which it invariably occasions.

Whatever may be your occupation, take plenty of daily exercise in the open air. If you can not work in the garden, saw and split wood, or do something else useful; walk and run briskly, or ride on horseback. Don't say that you have not time, for, in the long run, you will find it the best "put in" of anything which you have done.

Always have your house, especially the sleeping apartment, well ventilated, be it warm or cold weather.

Never sit in a room on a cold or damp day without a fire, if you are in any degree chilly and uncomfortable. But few causes are more productive of disease than this practice, which is almost universal. People generally take their stores down too early in the Spring, and neglect putting them up till late in the Fall; some, in fact, till dire necessity actually drives them to it. This is more particularly the case in hotels and boarding-houses, and is not only a great inconvenience, but an actual injustice to guests and boarders. Better to save the "almighty dollar" by robbing them of one-half their meals, than to deprive them of the comforts of a comfortable room on a cold chilly day.

Avoid contracting colds as much as possible; and when taken, endeavor to break them up as soon as you can. If you have been caught in a rain-storm, and your clothes have become drenched through, never sit down or remain idle one minute after you get where you can exchange them for dry ones. As soon as you discover that your pores are closed, from having allowed any part of your body to become chilled, keep yourself comfortably warm, within doors, till the difficulty has been removed. Drink plentifully of warm ginger, pennyroyal, or sage tea; evacuate the bowels by enemata if necessary, and live upon warm broths and gruels. Vapor baths are excellent in removing colds. Attend to these conditions promptly and no permanent injury will ensue; but if neglected, pulmonary diseases, which will ultimately in consumption, will often be the result, to say nothing of the dangers of pneumonia, congestions, etc.

Avoid sleeping on feather beds, and under too much clothing, as it retains the perspiration and noxious exhalations from the body, and prevents a free circulation of the air. Woolen blankets are preferable to cotton comforts.

Never indulge in the filthy, disgusting, and enervating practice (now a general vice among all so-called civilized nations) of smoking and chewing tobacco, as no other cause is more prolific of deleterious effects upon both mind and body. If you have become so thoroughly wedded to the "weed" that you can not give it up yourself, for the sake of posterity, don't permit your darling boy to imitate your bad example, so long as he remains under your guardianship; and when he arrives at man's estate, the chances are, if he be possessed of a reasonable share of common sense, that he will not then take it up. Mothers, see to it that your boys do not acquire this disgusting and deleterious habit before you are aware of it.

Bathing.—Keep the body clean by frequent ablutions. Never go more than one week in cold weather, and not more than one or two days in warm weather, without washing your person all over. Regulate the temperature of the water by that of the weather, and the constitution and vitality of the system. If the constitution be feeble, with but little vitality in the system, never, especially in Winter, use water with the temperature much below the heat of the body—that is 96° Fahrenheit; then wipe yourself perfectly dry, and rub briskly

with the hand, or a dry towel. Persons of strong, robust constitutions, use cold water, as the superabundance of animal heat will be sufficient to get up a reaction, and carry off the excessive cold. Were the above rules universally and strictly observed, nine-tenths of the "ills" and "ails" to which human flesh is heir would disappear from the face of our beautiful earth.

Every person who toils daily at any kind of labor, requiring great physical or mental exertion, should be extremely careful to practice a regular system of ablution. Sometimes a person may be so completely exhausted as to render this anything but an inviting performance; yet by its prolonged omission a great deal of refreshment which the hours of repose are designed to impart is lost. To be cleanly is a strict religious duty, and is absolutely essential to sound and refreshing slumber; hence the labor of keeping one's person clean is amply repaid by the elasticity which follows nightly ablutions before retiring. Heed this advice, and you will sleep soundly; disregard it—go frequently to bed unwashed, and you will rise in the morning unrefreshed, with feelings of lassitude which the exertions of the day will hardly be able to remove.

The third layer of the true skin, says Dr. HEBBARD, is full of blood-vessels, that, if all were rolled into a mass, would be larger than the heart itself, and so full of nerves, that all put together would make a mass larger than the brain. Therefore the vast importance of this organ, and hence the philosophy of external applications, as steam, water, the human hand, etc. Through all this network run perspiratory tubes, of which there are over seven hundred thousand, or twenty-eight miles of pores, through which pass five out of every seven pounds of all the impurities of the blood. If these are closed, these impurities remain in the blood, and break out in the shape of pimples, humors, etc., on the skin, or fasten upon the glands, the lungs, and other internal organs. Hence the necessity of bathing. All people ought to bathe both for health and cleanliness. There is no occasion for giving children cream of tartar or brimstone to physic out the blood, if they are kept clean. On the prominent parts of the face, in the flexions of the joints, in the arm-pits, etc., are little oil wells called *sebaceous follicles*, which secrete from the blood an oil with which to lubricate those parts. If this is not washed off it will become rancid, concrete, and foul.

Directions for Bathing.—Dr. FITZGERALD, of England, gives the following judicious directions to bathers:

1. Do not bathe immediately after a full meal; the best time for bathing is midway between breakfast and dinner.

2. Do not bathe fasting; if a bath be taken early in the morning, a piece of bread and butter, or a biscuit, should be eaten from half an hour to an hour beforehand, with a cup of milk.

3. The most common error is the fear of entering the water while the body is too hot; it is far better to plunge boldly in while warm than to wait to cool, as at no time is a person so ill calculated to bear the shock of cold water as when cooled by the evaporation of the perspiration. Do not, however, take violent exercise before bathing, so as to induce perspiration but enter the water with the body in a moderate glow.

4. Do not remain long in the water; from two to five minutes is sufficient for an invalid. When the water is very cold, one or two rapid plunges only should be taken, and then the body should be briskly rubbed with a towel. A cold bath is never very beneficial, unless the whole surface is in a glow on leaving the water.

5. Do not bathe more than once a day.

6. Do not walk into the water, but plunge in head foremost; if this is not feasible, thoroughly wet the head and face first.

7. On leaving the water, wrap a dry towel round the head; this serves not only to dry the hair, but prevents headache.

8. Cramp is not nearly so common a cause of fatal accidents as apoplexy, epilepsy, etc., which are frequently induced by neglect of the above rules. Should cramp come on, endeavor to kick out the limb vigorously, regardless of the pain. Should it persist, paddle quietly with one hand if in water beyond your depth, or float on the back, rubbing the affected leg with the other hand. Do not lose presence of mind; remember, no human body will sink while air remains in the lungs; frantic struggles exhaust the strength, and allow water to enter the mouth and lungs. Throw the head well back till the chin points upward, and remain quiescent; the legs then come to the surface, and the body will float for an indefinite time.

The Air we Breathe.—The earth is surrounded by an atmosphere from fifty to one hundred miles in height. At the earth's sur-

face the temperature is generally above the freezing point, else the whole earth would be covered with an eternal mantle of ice. In the latitude of New York, at about four or five miles above the surface of the ground, there is a perpetual icy arch of atmosphere, where the air is in the temperature of eternal frost. The mountain peaks which penetrate this stratum are covered with perpetual snow. This arch is highest under the equator, where it is between fifteen and sixteen thousand feet; and mountains of that height are capped with snow. The height of this arch constantly diminishes as we approach the poles from the equator, until it meets the earth, a few degrees this side of each pole, where there is constant snow and ice. In latitude 50° north, the distance from the earth to this perpetual region of snow is about six thousand feet; in latitude 55° north, it is about five thousand feet; in latitude 80° north, it is scarcely five hundred feet; in latitude 85° north, it is hardly one hundred feet; while at the poles water must have remained solidified or congealed into ice since the creation.

Under this state of things we see that the atmosphere is more condensed as we pass north from the equator, and contains a greater quantity of the vital principle. So in the temperate zone, the human family becomes most athletic and vigorous. People who move from the cool, bracing climates of the north to the tropics are apt soon to fall into feeble health, and depreciate, as they approach the equator. The people born within the tropics are smaller and feebler in frame, digest their food imperfectly and in smaller quantities; the lungs, heart, and liver are of considerably less weight than those of the people who inhabit higher latitudes.

A person of ordinary size consumes about thirty cubic inches of oxygen gas in a minute; he breathes twenty times in a minute, and every time he breathes takes into his lungs fifteen cubic inches of atmospheric air, which contain three cubic inches of oxygen gas; so that one-half of that which is inspired disappears in every act of respiration; this will amount to about two thousand cubic inches in an hour, and forty-five thousand cubic inches in twenty-four hours. Thus one man will consume in twenty-four hours all the oxygen contained in a space of three hundred and twelve square feet. Whenever an individual shall breathe the air that is adulterated with impure or noxious matters, although he may obtain the

requisite quantity of air in volume, yet the laws of nature are violated, and his health must suffer; so if the volume of air is rarefied by heat, the quantity of oxygen to supply the blood through the lungs will be diminished, and the individual will lose his strength and become enfeebled. A hot climate destroys the physical powers of man, while, on the contrary, a cold climate, by condensing the atmosphere into a small space, and affording a greater quantity of oxygen in a given number of square feet, surprisingly increases the faculties of the being called man.

Expanding the Lungs.—The lungs are like a bladder in their construction, and can be stretched open to double their ordinary size, with perfect immunity from consumption. Step out in the purest air you can find; stand perfectly erect, with head and shoulders back, and then fixing the lips as if you were going to whistle, draw the air through the lips into the lungs. When the chest is about half full, gradually raise the arms, keeping them extended, with the palms of the hands down, as you suck in the air, so as to bring them over the head just as the lungs are quite full. Then drop the thumbs inward, and after gently forcing the arms backward and the chest open, reverse the process by which you draw your breath till the lungs are empty. This process should be repeated immediately after bathing, and also several times through the day. It is impossible to describe to one who has never tried it the glorious sense of vigor which follows this exercise. It is one of the best expectorants in the world. We know a gentleman the measure of whose chest has increased by this means some three or four inches, during as many months.

Respiration.—The relation of respiration to digestion, to circulation, to nutrition, and to elimination is very little understood, even by physiologists and physicians. No one would ever have consumption if the lungs were kept duly expanded by proper breathing. Many cases of severe colds are cured at once by respiratory movements. The worst attacks of diarrhea have been promptly arrested, and even the cholera itself has been speedily cured, by deep, full, and active respirations. In all putrid and eruptive fevers nothing is more important than abundance of pure air.

Breathing Night Air.—A writer in *Good Health* says: "It was formerly the universal belief that the air of night was very injurious. But the fact is, that, except under peculiar cir-

cumstances, it is even more healthful than that of the day-time. The night air of large cities, such as London, when the bustle and commotion, which cause it to be loaded with dust particles, is comparatively quelled, and the numerous fires which contaminate it with their smoke are mostly extinguished, is purer than that of the day.

But there is still another reason for at times adopting night, even in preference to day, ventilation. In sultry weather it is a common mistake to open the windows instead of keeping them altogether closed, as is the case in very hot climates. But a little reflection will show that, since the height of the thermometer in the sun always greatly exceeds that shown at the same time by another thermometer placed in the shade, by opening the windows we admit air much heated into our rooms. The proper time, under such circumstances, for ventilation is during the night, when the external atmosphere has cooled down. By adopting this plan in hot weather, the temperature of a room may always be kept several degrees lower than if the opposite course is pursued.

Health and Hot Air.—There is not, probably, a more healthful method of warming apartments than by open fires; but on account of its wastefulness of fuel it is very generally abandoned in our country. Close iron stoves and hot-air and steam-pipe furnaces, evidently vitiate the air, depriving it of its natural freshness and invigorating qualities, probably destroying some of its vital but more subtle elements, thus sowing the seeds of consumption. One of the ingredients of natural air is ozone. The eminent chemist, Dr. GRAHAM, of the London University, tells us that this element, which the all-wise Creator has placed in the atmosphere for us to breathe, and which is proved to be absolutely necessary to health, is decomposed or destroyed at a temperature of 140° Fahrenheit. If so, then we are destroying it by our iron-heating surfaces, whether hot-air stoves, furnaces, steam-pipes, or even hot-water pipes.

Air Poison.—People have often said that no difference can be detected in the analyzation of pure and impure air. This is one of the vulgar errors difficult to dislodge from the public brain. The fact is that the dense air of a crowded room gives a deposit which, if allowed to remain for a few days, forms a solid, thick, glutinous mass, having a strong odor of animal matter. If examined by the microscope, it seems to undergo a remarkable change. First of all it is converted into a vegetable

growth, and this is followed by the production of multitudes of animalcules; a decisive proof that it must contain organic matter, otherwise it could not nourish organic beings. This was the result arrived at by Dr. SMITH, in his beautiful experiments on the air and water of towns, where he showed how the lungs and skin gave out organic matter, which is in itself a deadly poison, producing headache, sickness, disease, or epidemic, according to its strength. Why, if "a few drops of the liquid matter, obtained by the condensation of the air of a foul locality, introduced into the vein of a dog, can produce death with the usual phenomena of typhus fever," what incalculable evil must it not produce on those human beings who breathe it again and again, rendered fouler and less capable of sustaining life with every breath drawn? Such contamination of the air, and consequent hot-bed of fever and epidemic, it is easily within the power of man to remove. Ventilation and cleanliness will do all so far as the abolition of this evil goes, and ventilation and cleanliness are not miracles to be prayed for, but certain results of common obedience to the laws of God.

Winter Rules.—In going into a colder air, keep the mouth resolutely closed, so that by compelling the air to go circuitously through the nose and head, it may become warmed before it reaches the lungs, and thus prevent those shocks and sudden chills which frequently end in pleurisy, pneumonia, and other forms of disease. Never stand still a moment out of doors, especially at street corners, after having walked even a short distance. Never ride near the open window of a vehicle for a single half minute, especially if it has been preceded by a walk; valuable lives have thus been lost, and good health permanently destroyed.

Effects of Sunshine.—An open window, says Dr. DIO LEWIS, with the direct rays of the sun coming in, is good for children. On a hot Summer day to lay the little one down near the window, quite nude, and let it lie some minutes where the rays of the sun may fall upon the skin, will give it new life. There is a vital relation between sunshine and a vigorous human being. Seclusion from sunshine is one of the greatest misfortunes of civilized life. The same cause which makes potato-vines white and sickly while grown in dark cellars, operates to produce the poor, sickly girls that are reared in our parlors. Expose either to the

direct rays of the sun and they begin to show color, health, and strength. When in London some years ago, I visited an establishment which had acquired a wide reputation for the cure of those diseases in which prostration and nervous derangement were prominent symptoms. I soon found the secret of success in the use made of sunshine. The slate roof had been removed and a glass one substituted. The upper story was divided into sixteen small rooms, each provided with lounges, washing apparatus, etc. The patients each, on entering his little apartment, removed all his clothing, and exposed himself to the direct rays of the sun. Lying on a lounge, and turning over from time to time, each and every part of the body was thus exposed to the life-giving rays of the sun. Several London physicians candidly confessed to me that many cases which seemed only waiting for the shroud, were galvanized into life and health by this process.

A writer in *Harper's Bazar* has the following sensible remarks on the health-giving properties of the sun's rays:

Every one is familiar with the process of growing celery. A deep trench is dug, in which the seed are sown or sprouts set, and with the growth of the plant the earth is carefully heaped up until the whole is nearly buried. By this means the light is excluded almost entirely, and the vegetable becomes the pale and tender esculent of our tables.

Paleness and tenderness are always the result of depriving an organized being, whether a plant or an animal, of the light of the sun, but these qualities, however desirable in a sprig of celery, are indications of an artificial and unwholesome condition. The human being soon loses in obscurity his color and toughness, and with them all brightness of intelligence and vigor of body. Children brought up in mines and cellars are blanched, dwarfed, stupid, liable to diseases of all kind, and short-lived; and grown people, however vigorous they may have been previously, will soon, when deprived of light, become pale and feeble.

There can not be a greater mistake than for our delicate dames, who pass so much of their lives in-doors, to sit or lounge in dark rooms. They require all the sun's light they can get. Parents who live in cellars soon contract disease, and are afflicted with children born with malformations. So common are these misfortunes that seventeen out of one thousand births will present an offspring with a want of a hand, arms, legs, or feet, or sight or hearing.

Weak and sick children are especially benefited by exposure to the sun's light, and mothers would do well to reverse their usual order to the nurse, "Keep in the shade." We say, and we have science and experience on our side, **Keep in the sun.**

GOD made man and woman for the sunlight. Thousands of women are dying for the want of this element. He made them also for the air, and therefore women as well as men should be in it most of the time. We breathe one-eighth as much through the skin as by the lungs; therefore the clothing should be as porous as possible, so as to admit the atmospheric air to the skin. Clothing should be washed often, and that worn through the day should not be used in the night-time. Sleeping rooms should be elevated, and exposed to the sunlight and air at least four or five hours in the morning. Sun baths and air baths daily are advisable. Dr. FRANKLIN was in the habit of taking an air bath when restless at nights. These are advised, instead of narcotics, for sleepless persons.

Bodily Carriage.—Instead of giving all sorts of rules about turning out the toes, and straightening up the body, and holding the shoulders back, which are of no value to many because soon forgotten, or productive of a feeling of awkwardness and discomfort which procures a willing omission, all that is necessary to secure the object is to hold up the head and move on, letting the toes and shoulders take care of themselves. Walk with the chin but slightly above a horizontal line, or with your eye directed to things a little higher than your own head. In this way you walk properly, pleasantly, and without any feeling of restraint or awkwardness. If any of you wish to be aided in securing this habitual carriage of body, accustom yourselves to carry your hands behind you, one hand grasping the opposite wrist. Englishmen are admired the world over for their full chests, broad shoulders, sturdy frames, and manly bearing. This position of body is a favorite with them—in the simple promenade in the garden or gallery, in attending ladies along a crowded street, in standing on the street, or in public worship. Many persons spend a large part of their waking existence in the sitting position. A single rule, well attended to in this connection, would be of incalculable value to multitudes—use chairs with the old-fashioned straight backs, a little inclining backward, and sit with the lower portion of the body close against the back of the

chair at the seat. Any one who tries it will observe in a moment a grateful support to the whole spine; and we see no reason why children should not be taught from the beginning to write, and sew, and knit in a position requiring the lower portion of the body and the shoulders to touch the back of the chair at the time. A very common position in sitting, especially among men, is with the shoulders against the chair back, with a space of several inches between the chair back and the lower portion of the spine, giving the body the shape of the half hoop; it is the instantaneous, instinctive, and almost universal position assumed by any consumptive on sitting down, unless counteracted by an effort of the will; hence parents should regard such a position in their children with apprehension, and should correct it at once.

Effects of Diet.—"All who have abused their stomachs," says Dr. MOTT, "will assuredly be brought to an account for it sooner or later. I am not sure," he continues, "but more disease and suffering results from intemperance in eating than intemperance in drinking. Hence, there is as much need of a temperance eating as a temperance drinking society."

Next to imperfect ventilation, excessive eating makes the most serious inroads upon our health. Professor HITCHCOCK thinks we eat too much because we dine upon too great a variety of dishes, and suggests as a remedy that we should confine ourselves to one course. Several eminent men, among whom may be mentioned the distinguished Dr. JAMES JOHNSON, urge that every person should watch himself while eating, and when he discovers that the pleasures of the palate begin to lessen, at that moment he should stop. An eminent American writer, who declares the conviction that, of the men, women, and children in the United States, ninety-nine in every hundred eat too much, fears the evil will never be corrected until we adopt an expedient employed by some of the great philosophers—weighing our food.

Dr. DIO LEWIS writes: "I am confident that this expedient will meet every want, namely, *taking upon one's plate, before one begins to eat, all that is to be eaten!*"

"No one with ordinary reason would eat too much under this plan. Gourmands may sneer. I have only to say that this rule has been worth thousands to me. Its adoption in a family of children would remove at once all difficulties in the management of children's diet. The

dessert and the appetizing fascinations of a second and third course are thus avoided. While not one child in twenty, if allowed to eat without restraint, will stop when he has enough, nineteen children in twenty will observe the rule suggested without a struggle."

Health and longevity are not the only results of moderation in diet. Its influence is far from being limited to the body; its effect on the mind is still more important. CÆSAR, constitutionally addicted to excess, when resolved on some great exploit, was accustomed to diminish his diet to an extent truly marvelous, and to this diminution he ascribed the clearness and energy of mind which distinguished him in the hour of battle. When extraordinary mental vigor was desired by the First NAPOLEON, he used the same means to attain it. To his rarely-equalled moderation in diet, Dr. FRANKLIN ascribed his "clearness of ideas" and "quickness of perception." "I have lived temperately," said JEFFERSON in his old age, "eating little animal food, and that not as an aliment, so much as a condiment for the vegetables which constitute my principal diet." When Sir ISAAC NEWTON was composing his Treatise on Optics, he confined himself to bread and a little sack and water.

LEIBNITZ, when preparing some portions of his work on a Universal Language, was scarcely less rigid in his abstinence. MELANCTHON relates of LUTHER, that "a little bread and a single herring were often his only food for a day." Dr. CHEYNE, a celebrated physician, reduced himself from the enormous weight of four hundred and forty-eight pounds to one hundred and forty pounds, by confining himself to a limited quantity of vegetables, milk, and water, as his only food and drink; and the result was a restoration of health and mental vigor, and amid professional and literary labors, uninterrupted health and protracted life. It is probable that nobody ever repented having eaten too little.

A potato diet is found to greatly improve the quality of the blood. Hence roasted or baked potatoes are successfully employed as a specific against the sea scurvy, when other remedies have failed. It is singular, however, that boiled potatoes do not seem to have the same good effect.

Many people do not eat salt with their food, and the fair sex have a notion that this substance darkens the complexion. Salt seems essential to the health of every human being, more especially in moist climates. Without

salt the body becomes infested with intestinal worms. The case of a lady is mentioned in a medical journal, who had a natural antipathy to salt, and never used it with her food; the consequence was, she became dreadfully infested with these animals. A punishment once existed in Holland, by which criminals were denied the use of salt; the same affliction beset these wretched beings. We think a prejudice exists with some of giving little or no salt to children. No practice can be more cruel or absurd.

Very high scientific authority has sanctioned the opinion that good cheese, by chemical action in the stomach, materially aids digestion.

Some advise invalids to drink only cold water or milk. There are more invalids who can not drink cold water and milk without suffering and harm than there are who can not drink tea nor coffee without injury. Many a low-toned, weak-stomached person goes on from bad to worse, and in daily suffering, from drinking cold water or cold milk, which lowers the tone of their stomachs and aggravates indigestion ten-fold. A light, warm drink of tea, coffee, or cocoa, will refresh and stimulate and strengthen such a person, and be readily digested, and encourage the digestion of heavier food, while only pain and harm can come from the cold and harsher drinks.

The dyspeptic is sometimes unwisely advised to omit his third meal, and go eighteen hours without eating. No advice could be worse for many, if not most of this class of sufferers. Their malady is likely to be increased fearfully by such long fasting, and living in their society made positively unendurable, if not dangerous to life. A weak dyspeptic should neither be taxed by heavy or coarse feeding or long fasting. Far more dyspeptics would be benefited by eating four meals a day than would be by reducing the number to two. It is difficult, almost impossible, to give advice on such subjects which will apply uniformly to all cases; but we protest, in the name of experience and common sense, against such charity as the above.

Hall's Journal of Health advises that but a single cup of tea or coffee be drank at breakfast and supper—that science and fact unite in declaring them to be nutritious as well as stimulant, and hence they will tend to renew the system every day to the end of life, just as bread and fruits do. The habitual moderate use of tea and coffee at the first and last meals of the day, has another high advantage—it is

productive of incalculable good in the way of averting evils.

We will drink at our meals, and if we do not drink these, we shall drink what is worse—cold water, milk, or alcoholic mixtures. The regular use of the last will lead the young to drunkenness; the considerable employment of simple milk at meals, by sedentary people—by all, except the robust—will either constipate or render bilious; while cold water largely used, that is to the extent of a glass or two at a meal, especially in cold weather, attracts to itself so much of the heat of the system, in raising said water to the temperature of the body (about 100°) that the process of digestion is arrested; in the meanwhile, giving rise to a deathly sickness of stomach, to twisting pains, to vomitings, purgings, and sometimes even to cramps, to fearful contortions and sudden death; which things would have been averted had the same amount of liquid, in the shape of simple hot water, been used. But any one knowing these things, and being prejudiced against the use of tea and coffee, would subject himself to be most unpleasantly stared at and questioned, if not ridiculed, were he to ask for a cup or glass of hot water. But as tea and coffee are now universal beverages, are on every table, and everybody is expected to take one or the other as a matter of course, they are unwittingly the means of safety and life to multitudes. Taken in small quantities they prolong life, where a glass of cold water would destroy it. So that the use of these beverages is not merely allowable; it is politic; it is a necessity.

Dress and Disease.—There is no truth more firmly established among medical men than that disease follows fashion as much as bonnets do. When thin shoes are in fashion, consumption is the prevailing epidemic with females in every fashionable community of the country. When low-necked dresses are in the ascendant, sore throat and quinsy are the raging maladies; when “bustles” and “bishops” make their appearance, spinal affections become “the ton.” The reign of corsets is denoted by collapsed lungs, dyspepsia, and a general derangement of the digestive organs. Indeed, so intimately are dress and disease connected, that a doctor says that all he needs to determine what a majority of the women are dying of, is to have an inventory of their wardrobe handed to him.

Dr. GREEN, lecturing on physiology in New York, stated that an adult man, if unconfined,

takes in forty square inches of air in a breath, but a great difference is found even when in his ordinary dress—then he only takes in thirty-two inches. If then, in a man in the expansion of his chest, a coat and vest cause one-fifth less, what must be the effect of the lacings and paddings often employed by females. There is not a medical man who is not a daily witness of the dreadful consequences.

It is, however, to be gratefully observed that women are giving more and more attention to the laws of life, and that female dress is more healthful and rational now than it has been at any other period during the century. Women wear warmer underclothing than ever before. Boots, thick and high, have superseded the wafer soles. Wasp waists are no longer cultivated except by the very ignorant; because consumption is no longer fashionable. Plumpness and full waists are now the mode. Cutting dresses so as to expose the bust, is also generally an obsolete custom in respectable circles; even the Pompadour wears the mask of a lace chemisette. A few of the more ambitious, at weddings and full-dress parties, still decline to cover their nakedness, but the verdict of the leaders is that to dress to the lower edge of modesty is as destructive of personal health as it is ruinous to social purity. The head-gear is an exception to the salutary tendency we have mentioned. The man-milliner of Paris still spreads neuralgia to the ends of the earth, for he decrees that the stylish bonnet of the period shall be limited to a minute band of lace and feathers, supported upon the organ of vanity.

It is a lamentable fact that our women of fashion have little independence in matters of dress. They usually ape Paris, instead of adapting their clothing to American taste, American morals, American resources, and American climatic needs. Strictly speaking, there are no leaders of fashion in this country; the nearest a few in our commercial centers come to it, is in being the foremost to adopt every absurdity that may be dictated to them by the despotic court mantua-makers of France. If the women of this Republic continue to subject their own judgments to foreign domination without a murmur, we can not foresee how soon those few healthful customs of the present, to which we have referred, may be abolished, tight lacing, thin shoes, and *decollete* dressing reappear, and fashion be again fully in league with death.

In England, where the children go half-

naked, where the servants do their work in the morning with their arms naked up to their shoulders, and where the women are always lightly clothed, pulmonary consumption exists in enormous proportion. In London, one-fourth of the deaths result from this cause.

The most healthful clothing for our climate the year round, is that made of wool. If worn next the skin by all classes, in Summer as well as Winter, an incalculable amount of coughs, colds, diarrheas, dysenteries and fevers would be prevented, as also many sudden and premature deaths from croup, diphtheria and lung diseases. Winter maladies would be prevented by the tendency of a woollen garment to keep the natural heat about the body more perfectly, instead of conveying it away as fast as generated, as linen and flaxen garments do; as also cotton and silk, although these are less cooling than Irish linen, as any one can prove by noticing the different degrees of coldness on the application of a surface of six inches square of flannel, cotton and linen to the skin, the moment the clothing is removed. The reason is, that wool is a bad conductor of heat, and linen is a good conductor.

It is more healthful to wear woollen next the skin in Summer, because it absorbs the moisture of perspiration so rapidly, as to keep the skin measurably dry all the time. It is curious to notice that the water is conveyed by a woollen garment from the surface of the body to the outer side of the garment, where the microscope shows it condensed in millions of pearly drops; while it is in the experience of the observant, that if a linen shirt becomes damp by perspiration, it remains cold and clammy for a long time afterward; and unless removed will certainly cause some bodily ailment. Flannel worn during the day should be taken off at night, turned wrongside out, exposed to a free current of air, and allowed to become thoroughly dry before putting on again.

In the night-sweats of consumption, or of any debilitated condition of the system, a clean, dry, woollen flannel night-dress is immeasurably more comfortable than cotton or linen, because it prevents that sepulchral dampness and chilliness of feeling, which are otherwise inevitable.

Extra clothing is essential to the aged and the young. Place a thermometer under the arms of an adult person, and it will run up to ninety-eight degrees; this is the average the world over. Under the arms of children or old people it will run up to only ninety degrees, or less. Therefore, children and old people

should be dressed warmer than the middle-aged. Mothers, not understanding this fact, dress their little ones insufficiently, and, exposing them to the cold north-easters, are surprised and agonized by "midnight cries." Diphtheria, croup, etc., lay their cold hands upon them thus exposed, and when these beautiful buds are transplanted, to bloom above, these poor ignorant mothers say, "The Lord gave, and the Lord hath taken away." No, this is the "slaughter of the innocents." The ravages of the cholera are a cipher compared to this.

Sleep.—Sleep is a stern necessity. If men will insist in cheating sleep, her "twin sister Death" will avenge the insult. All who think a great deal, and have to work hard, need all the rest they can well get without resorting to stupefying means to secure it. Many people so laud early rising as would lead one to suppose that sleep was one of those lazy, sluggish, and bad practices that the sooner the custom was abolished the better. Sleep is as necessary to a man as food, and as some do with one-third the food that others require, so five hours of sleep is sufficient for one, while another requires seven or eight hours. Some men can not by any possibility sleep more than four or five hours in twenty-four, and therefore, true to the inherent selfishness of human nature, they abuse all who sleep longer. No one should be taunted for sleeping eight hours if he can.

Children require more sleep than older persons because much of their food is appropriated in adding to their growth, and also because of their greater activity. Young persons need from ten to twelve hours, depending upon the constitution and habits of the person. Although too much is hurtful, it is less so than too little; in the latter case there is rapid exhaustion of the vital power, and the person grows old fast. Every possible effort should be made to have children go to sleep in pleasant humor. Never scold or give lectures, or in any way wound a child's feelings as it goes to bed. Let all, old and young, banish business and every earthly care at bed-time, and let sleep come to a mind at peace with God and all the world.

There is no fact, says Dr. FORBES WINSLOW, more clearly established in the physiology of man than this, that the brain expends its energies and itself during the hours of wakefulness, and that these are recuperated during sleep. If the recuperation does not equal the expenditure, the brain withers—this is insanity. Thus it is that, in early English history, persons who

were condemned to death by being prevented from sleeping, always died raving maniacs; thus it is also that those who are starved to death become insane—the brain is not nourished, and they can not sleep. The practical inferences are three: 1. Those who think most, who do most brain work, require most sleep. 2. That time "saved" from necessary sleep is infallibly destructive to mind, body, and estate. Give yourself, your children, your servants—give all that are under you the fullest amount of sleep they will take, by compelling them to go to bed at some regular early hour, and to rise in the morning the moment they awake; and within a fortnight Nature, with almost the regularity of the rising sun, will unloose the bonds of sleep the moment enough repose has been secured for the wants of the system. This is the only safe and sufficient rule; and as to the question how much sleep any one requires, each must be a rule for himself—great Nature will never fail to write it out to the observer under the regulations just given.

It is generally advised that it is better to sleep resting upon the right side. If you sleep upon your back, says HALL's *Journal of Health*, especially after a hearty meal, the weight of the digestive organs, and that of the food, resting on the great vein of the body, near the back bone, compresses it and arrests the flow of blood more or less. If the arrest is partial, the sleep is disturbed, and there are unpleasant dreams. If the meal has been recent or hearty, the arrest is more decided, and the various sensations, such as falling over a precipice, or the pursuit of a wild beast, or other impending danger, and the desperate efforts to get rid of it, arouse us, that sends on the stagnating blood, and we wake in a fright, or trembling, or perspiration, or feeling of exhaustion, according to the degrees of stagnation and the length and strength of the effort made to escape the danger. But when we are not able to escape the danger, when we do fall over the precipice, when the tumbling building crushes us, what then? *That is death!* That is the death of those found lifeless in their bed in the morning, of whom it is said: "They were as well as they ever were the day before;" and it is often added, "and ate heartier than common!"

High pillows tend to check the circulation of blood, and superinduce apoplexy and other dangerous attacks.

There is reason to believe, observes Miss NIGHTINGALE, that not a few of the apparently unaccountable cases of scrofula among

children proceed from the habit of sleeping with the head under the bed-clothes, and so inhaling air already breathed, which is further contaminated by exhalations from the skin. Patients are sometimes given to a similar habit; and it often happens that the bed-clothes are so disposed that the patient must necessarily breathe air more or less contaminated by exhalations from the skin. Never use anything but light blankets as bed-covering for the sick. The heavy, impervious cotton counterpane is bad, for the very reason that it keeps in the emanations from the sick person, while the blanket allows them to pass through. Weak patients are invariably distressed by a great weight of bed-clothes, which often prevents their getting any sound sleep whatever.

Never go to bed with cold or damp feet. Never sleep with the head in the draft of an open window. Let more covering be on the lower limbs than on the body. Have an extra covering within reach in case of a sudden and great change of weather during the night.

Feather beds should be aired once a week—and always in the crater of Vesuvius, or some other fire that will be sure to destroy them, for few things are more unhealthy to sleep on, especially during hot weather. They exhaust instead of invigorate the system.

The position of the bed is regarded by some eminent writers as a matter of importance. A medical writer in the *Dublin Journal of Medicine*, contends for the old notion that people sleep much better with their heads to the north. He has tried the experiment in the case of sick persons with marked effect, and insists that there are known to exist great electric currents, always crossing in one direction around the earth, and that our nervous systems are in some mysterious way connected with this electrical agent. Dr. JULIUS VON FISCHWEILER, a German physician, who died a few years since at the advanced age of 109, always slept with his head to the north, and the rest of his body as nearly as possible in a meridional position; by which, he thought, the iron in his body became magnetized, and thus increased the energy of the vital principle, and prolonged human life. Without attempting to decide whether the electric current, or magnetic forces, maintain their equilibrium in the human body more perfectly during sleep, when the head is to the north, it can do no harm, and may do good, to have the beds all head toward the north pole. Many persons contend

that they can never rest as well with their heads in any other direction.

Poisonous odors in the sleeping apartments have not unfrequently produced the most fatal effects. *L'Union Medicale* is very positive on the subject of the deleterious action exercised by the perfume of flowers, especially such as lilac, jessamine, hyacinth, and tuberose, on persons who have the imprudence to leave them at night in the bed-chamber. The more or less fictitious cases of suicide and assassination, which have been related under this head, should not induce us to doubt the reality of the asphyxiating power possessed by strongly-smelling flowers. Certain odoriferous fruits share the same deleterious property. A grocer who slept in a small room, in which the contents of three chests of oranges had been piled up, was found asphyxiated in the morning, and was only resuscitated by the most energetic treatment. A case of death was recently reported in New York City, resulting from the odor of a large quantity of quinces kept in the sleeping room.

It may be added in this connection, that it is questionable if a great mistake is not made in keeping fruits and vegetables under our dwellings. It is supposed, by those who have investigated the matter, that a large proportion of disease in farmers' families is caused by the decaying vegetation in cellars. The public are not aware of the terrible fatality of diseases in the country at times—especially typhus and typhoid fevers, scarlatina, and diphtheria. Their ill-ventilated rooms, impure cellars, and pig-stye and barn-yard proximity, frequently render the air they breathe almost as impure as that of the filthy streets of the overcrowded cities.

Early Rising.—An almost incalculable amount of valuable time can be saved in the aggregate of human life by a fixed habit of early rising. This, of course, should be the result of an equally important precedent habit—early retiring. One of the worst sham economies of time is that filched from necessary sleep. The wholesale, but blind commendation of early rising is as mischievous in practice as it is errant in theory. Early rising is a crime against the noblest part of our physical nature, unless it is preceded by an early retiring. Children should not be waked in the morning. Let nature wake them up—she will not do it prematurely; but have a care that they go to bed at an early hour; let it be earlier and earlier,

until it is found that they wake up of themselves in full time to dress for breakfast. Being waked up early and allowed to engage in studies late and just before retiring, has given many a beautiful and promising child brain fever, or determined ordinary ailments to the production of water on the brain.

Effects of Tobacco.—Dr. B. W. RICHARDSON, an eminent English physiologist and chemist, in a paper read before the British Association for the Advancement of Science, in 1864, stated that immoderate smoking is unquestionably very injurious to the animal functions. The blood is made too fluid; the biliary secretion is constantly deranged; there is dryness of the tongue and frequent nausea. On the heart the symptoms are very marked. They consist of palpitation, a sensation as though the heart were rising upward, a feeling of breathlessness, and, in bad cases, of severe pain through the chest, extending through the upper limbs. The action of the heart is intermittent, and faintness may be experienced. Extreme smoking is also very injurious to the organs of sense. In all inveterate, constant smokers, the pupils of the eye are dilated, owing to the absorption of the nicotine, and the vision is impaired in strong light; but the symptom which most of all affects the vision is the retention of images on the retina after the eye is withdrawn from them. Thus, if he turns his eyes from a window, he retains the impression of the window, the panes seeming red and the bars dark. On the sense of hearing, inveterate smoking produces disturbances; these consist of disquiet, deafness, and ringing or whistling in the ears. The circulation of the brain is sometimes also disturbed, and giddiness and vertigo are produced. The muscles, after extreme smoking, are prostrated. Long smoking affects the mucous membrane of the mouth, causing "smoker's sore throat." There are also some other effects occasionally produced in the mouth, viz., sponginess of the gums and tartar on the teeth. On the whole, however, smoking does not injure the teeth. These are the worst effects of tobacco; they all point to functional disturbance.

The question remains whether worse effects ever follow from over-indulgence in smoking. The great effect of tobacco is to arrest the functional processes on which growth and development depend. To the whole body of the growing youth, therefore, the act of smoking is decidedly deleterious.

From other authorities and other experiences

than Dr. RICHARDSON, we may conclude that the habit of using tobacco in any form is more or less pernicious and dangerous. REES' Cyclopedia says a drop or two of the oil of tobacco, placed on the tongue of a cat, produces convulsions and death in the space of one minute. BOCARME, of Belgium, was murdered in two minutes and a half by a little nicotine, or alkali of tobacco. The late Governor JAMES SULLIVAN, of Maine, said: "My brother, General JOHN SULLIVAN, of the Revolutionary War, used snuff, and snuff lodged him prematurely in the grave." Dr. TWITCHELL expressed the opinion that sudden deaths and tobacco, among men, were usually found together, and sustained his opinion by an array of facts that would seem almost conclusive. Scores of men have been found dead in their beds, or fell dead in the streets or elsewhere, who had been victims to this poison. A college of American physicians has said, that no less than twenty thousand in our land annually die by the use of tobacco.

Three young men formed a smoking club, and they all died within two years from the time they formed it. Their physician was asked of what disease they died? He truthfully replied: "They were smoked to death." A youth of sixteen fell dead with a cigar in his mouth in a dram shop. What caused his death? The coroner's inquest said: "It was a mysterious act of God." The minister, at the funeral, consoled his friends by saying much the same thing. Physicians said it was the heart disease; but said nothing about its cause. A sensible woman, knowing the boy's habits, said: "Tobacco killed him;" and she was right. It deranged the action of the heart; that organ consequently ceased to perform its accustomed functions, and the victim fell—fell to rise no more.

Tobacco has spoiled and utterly ruined thousands of boys, inducing a dangerous precocity, developing the passions, softening and weakening the bones, deranging the nerves, and greatly injuring the spinal marrow, the brain, and the whole nervous fluid. A boy who early and frequently smokes, or in any way uses large quantities of tobacco, never is known to make a man of much energy of character, and generally lacks physical and muscular as well as mental energy. We would particularly warn boys who want to be anybody in the world, to shun tobacco as they would a deadly poison.

The superintendents of the New York Insane Asylum, in a recent report, state: "Our own

observation leads us to the belief that this pernicious weed has done more to enervate the body and precipitate the mind into the vortex of insanity than spirituous liquors. But tobacco, like opium and alcohol, so works into the very vitals of the system, into the very fiber of body and soul, as to establish for itself an almost resistless sway over the will of its victim. There is a terrible strength sometimes in the grasp of habit, but this is not habit, or rather, it is habit with all that is mighty in it, and something superadded that is inexpressibly mightier. It is such an actual physical change that nervous energy comes to depend on the tobacco instead of its own normal source, and the latter, to a large extent, ceases its supply. The very being—no matter how exalted, or cultivated, or refined the individual—in its holiest activities Godward and manward, is compelled to lean, almost with its whole weight, on what it often unutterably loathes. One of the most distinguished and devoted ministers in the vicinity of Boston once said: "I am a slave; I feel it with inexpressible shame; I can not make a prayer in the pulpit without my tobacco."

How a Clergyman Cured his Tobacco Appetite. "I had a deep well of very cold water, and whenever the evil appetite craved indulgence, I resorted immediately to fresh-drawn water. Of this I drank what I desired, and then continued to hold water in my mouth, throwing out and taking in successive mouthfuls, until the craving ceased. By a faithful adherence to this practice for about a month, *I was cured*; and from that time to this, have been entirely free from any appetite for tobacco."

Alcoholic Abstinence.—Dr. J. E. SNODGRASS, in an able scientific lecture of unusual originality and interest, delivered in New York, took issue with those who hold that alcohol is food. Such a theory is contradicted by both alcohol's chemical constituents and its effects upon the human system. It is a poison, and as such indigestible. The drunkard's breath is evidence that alcohol is absorbed into the blood through the lungs, and we know that this poison quits the body as it enters, unchanged. The lecturer held that alcohol has no place in a healthy body. Chemical analysis detects a number of mineral substances in the body, such as lime, and even phosphorus in the bones, soda in the bile, ammonia in the urine, and iron and salt in the blood, which are found in the bodies of even infants at birth;

and, therefore, we have nature's warrant for introducing these agents, powerful as they are, into our systems at certain times and in proper quantities, as constituents of our food. But, finding no alcohol either in the natural solids or in the fluids of the body, by parity of reasoning, we have no right to introduce them into our system. If we do so, we should not be surprised at those direful results which are seen to follow our violation of the laws of animal chemistry and physiology, beginning with that staggering gait of the drunkard, which is the very reverse of the effect of the grain or fruit from the perverted use of which, with the aid of the air and heat, this unnatural agent is derived, in the process of distilling or brewing. The lecturer introduced interesting statistics of cholera, from his own professional observation in part, to show that the water-drinkers have vastly the advantage over the rum or beer-drinkers. It was, for instance, asserted that the Sons of Temperance in New Orleans, during one of the cholera visitations there, ascertained that the ratio of deaths by the malady among the members of their fraternity was as only one to five hundred, of the total mortality of the city. Dr. SNODGRASS said that this corresponded with the results of his own observation in the city of New York, during the cholera visitation of 1866.

Miasms.—Ponds, sluggish streams, and swampy soils always generate miasms, and these when inhaled produce disease. Heat so rarefies miasm as to make it comparatively innocuous. Hence the coolness of the early morning and of sundown throw the miasm to the surface by condensing or concentrating it; while the heat of the day of the Summer's sun so rarefied and lightened it as to send it upward to the clouds; and the great practical truth follows, that miasm exerts its most baleful influence on human health, as it ascends at sunrise, and descends at sunset. Those exposed to these influences may exempt themselves almost altogether from malarious diseases, such as diarrheas, dysenteries, and chills and fevers, by eating a hearty and warm meal before entering upon the exposure. The philosophy of the matter is, that a hot or hearty meal, or at least a cup of hot, strong coffee, with milk, so excites the circulation and so invigorates the whole frame that it acquires the power of resisting the disease-engendering influences of the miasm.

Fungous Influences.—Fungous growths are

not alone confined to the vegetable kingdom. Professor J. H. SALISBURY has shown that the cause of "fever and ague" is no longer involved in mystery. He has not only detected, figured, and described, with minute accuracy, the species of fungous which produces this disease, but has propagated and cultivated the plant within doors to an extent sufficient to contaminate the atmosphere of the apartment, and induce attacks of fever among its inmates. His labors also demonstrate that measles are of cryptogamous or fungous growth.* These microscopic vegetable growths are probably also the predisposing cause of variola and small-pox, of the cholera and the rinderpest, and of the plague of olden time. Their dwelling-place is as universal as their growth is simple; the air we breathe contains them, and the winds waft their seminal spores from pole to pole. They attack the housekeeper's bread and cheese, her preserves, her paste, her ink, and her linen. Her yeast consists of a living organism which is among the lowest of the fungi, and there seems to be abundant experimental proof that the various kinds of fermentations, acetous, vinous, lactic, etc., are due to different kinds of organisms, or different generations of the same species, all of which are fungi. Their attacks are not confined to the seeming dead forms of matter, but they play havoc with our fruits (as the peach, the pear, the plum), and attack remorselessly the foreign gooseberry, and both the foreign and the native vine and grape.

Brain Work.—No man after middle age, if he hopes to keep his mind clear, should think of working his brain after dinner—a season which should be given up to enjoyment. The immediate result of post prandial labor is always inferior to that produced by the vigorous brain of the morning. When mental labor has become a habit, however, we know how weak are words of warning to make a sufferer desist, and when we are reminded of the answer made by Sir WALTER SCOTT to his physicians, who, in his last illness, foresaw that his brain would break down unless he desisted from brain work—"As for bidding me not work," said he, sadly, "Molly might as well put the kettle on the fire, then say, 'Now don't boil.'" It must not be supposed, however, that we wish to deprecate even severe mental labor; on the contrary, a well-organized brain demands exer-

cise, and, like the blacksmith's arms, flourishes on it. We believe that pleasurable brain work can be carried on to an almost limitless extent without injury. A poet in the full swing of fancy, a philosopher working out some scheme for the benefit of humanity, refresh rather than weaken their brain. It will be found that the great majority of those who have gained high honors in our universities, have also greatly distinguished themselves in after life. It is the hard, thankless task-work which tears and frets the fine gray matter of the cerebrum. It is the strain and anxiety which accompanied the working out of the great monetary transactions which produces that silent and terrible *ramollissement* which gradually saps the mind of the strong man, and reduces him to the condition of an imbecile.

Eye Sight.—*Spectacles.*—With most persons there is an epoch in life when the eyes become slightly flattened. It arises probably from a diminished activity of the secreting vessels. The consequence is that the globe is not kept quite as completely distended with fluids as in youth and middle age. There is thus an elongated axis of vision. A book is held further off to be read. Finally, becoming more flattened by the same inactivity within, the difficulty is met by putting on convex glasses. This is the waning vision of age. If, however, when that advancing is first realized, the individual persists in the attempt to keep the book in the old focus of vision—even if he reads under perplexing disadvantages, never relaxing, but perseveringly proceeding just as he did when his eyes were in the meridian of their perfection, the slack vessels will at last come up to his assistance, and the original focal distance will be re-established.

To Restore the Sight.—The preservation and restoration of sight is an important matter, yet easily attained by this simple rule. When the sight is too close, close the eyes, press the finger gently outwardly from the nose across the eyes. Short sight is caused by too great roundness of the eye, and rubbing or wiping them from their inner toward their outer angles flattens them, and thus lengthens or extends their angle of vision. But as long sight is caused by the too great flatness of the eyes, passing the fingers or towel from their outward angles inwardly, of course, rounds them up, and thus preserves the sight. By this simple means, all persons can adjust their sight to their liking, so as to read without glasses just as well when old as young.

* See *Ohio Agricultural Report*, 1863; and *American Journal of Medical Science*, January, 1860.

The value of this knowledge is second only to that of sight. JOHN QUINCY ADAMS used to practise this mode of manipulating his eyes, and recommended it to others.

Begin with a firm resolution, advises the *Medical and Surgical Journal*, never to use glasses of any kind for reading or writing. The ancients knew nothing about such contrivances; if they had there would have been poor eyes in abundance, and oculists to meet the emergency. CICERO never complained of imperfect vision at the age of sixty-three. He even wrote his letter by torchlight on the eve of being put to death by the waiting soldiers. HUMBOLDT died at ninety-two, having never been embarrassed with these modern contrivances—lunetts. JOHN QUINCY ADAMS, illustrious for scholarship, at a ripe old age saw without them. Indeed, it would be a laborious enterprise to collect a catalogue of names, in the chronicle of literary fame, of men and women who were independent of glasses.

Importance of Recreation.—The Americans, as a people, says Hon. EDWARD EVERETT, at least the professional and mercantile classes, have too little considered the importance of healthful, generous recreation. They have not learned the lesson contained in the very word which teaches that the worn-out man is re-created, made over again, by the seasonable relaxation of the strained faculties. The old world learned this lesson years ago, and found that, as the bow always bent will at last break, so the man, forever on the strain of thought and action, will at last go mad or break down. Thrown upon a new continent, eager to do the work of twenty centuries in two, the Anglo-American population has overworked and is daily overworking itself. From morning till night—from January to December—brain and hands, eyes, fingers, the powers of the body and the powers of the mind are in spasmodic merciless activity. There is no lack of a few tasteless and soulless dissipations which are called amusements; but noble, athletic sports, manly out-door exercises are too little cultivated in town or country.

Causes of Sudden Death.—Out of sixty-six cases of sudden deaths thoroughly investigated by medical men, only two were found that died from heart disease, nine of apoplexy, while there were forty-six cases of congestion of the lungs—that is the lungs were so full of blood that they could not work, there being not room enough for a sufficient quantity of air to enter to support life. The causes producing conges-

tion of the lungs are cold feet, tight clothing, costive bowels, sitting still until chilled after being warmed with labor or a rapid walk, going too suddenly from a close, heated room into the cold air, especially after public speaking; and sudden depressive news operating on the blood.

Care of Children.—One reason, observes HALL'S *Journal of Health*, why children die is because they are not taken care of. From the day of birth they are stuffed with food, choked with physic, sloshed with water, suffocated in hot rooms, and steamed in bed clothes. So much for in-door. When permitted to breathe a breath of pure air once or twice during the cold months, only the nose is permitted to peer into daylight. A little later they are sent out with no clothing at all on the parts of the body which need the most protection. Bare legs, bare arms, bare necks, girted middle, with an inverted umbrella to collect the air and chill the other parts of the body. A stout strong man goes out in a cold day with gloves and overcoat, woolen stockings, and thick double-soled boots, with cork between, and rubbers over. The same day a child of three years, an infant in flesh, blood, bone, and constitution, goes out with shoes as thin as paper, cotton socks, legs uncovered to the knees, neck bare—an exposure which would disable the nurse, kill the mother outright, and make the father an invalid for weeks. In this foolhardy attempt to harden children by an exposure to the severities of the weather, they not unfrequently sicken and die, and their death is imputed to a mysterious Providence, when in point of fact it is a presumption and a profanation.

Children should never be allowed to go to sleep with cold feet—which is frequently the cause of croup, diphtheria, or fatal sore throat. Let them go to sleep in pleasant humor, and sleep all they feel inclined to.

LIEBIG'S artificial milk for infants begins to be very highly esteemed in Germany. He claims that when well made, it is far superior to any ordinary substitute for human milk. The object aimed at in the formula given by Baron LIEBIG is to add to cow's milk those matters in which it is deficient. This is accomplished by adding to ten ounces of milk one ounce of wheat flour and boiling to a homogeneous paste. To this is added one ounce of malt powder, which has been finely pulverized and mixed with two ounces of water and fif-

teen grains of bicarbonate of potassa. Being allowed to stand for an hour and a half and then gently boiled for a few minutes, it is carefully strained from all husks, etc. It would seem that such a mixture would form a valuable article of food—more easily digestible than many of the ordinary substitutes for milk.

There is a favorite fancy of rendering infants and farther advanced children hardy and strong, by plunging them in cold water. This will certainly not prevent strong infants from growing stronger, but it is likely to kill three out of every five. Infants always thrive best with moderate warmth and milk-warm bath. The same rule applies to the clothing of infants and children. No child should have so slight clothing as to make it feel the effects of cold; warm materials, loose and wide clothing, and exercise, are indispensable for the health of the little ones. But above all things, their heads should be kept cool and generally uncovered.

Treatment of Diseases.—Under this head we have arranged, in alphabetical order, a large number of diseases and methods of treatment, which seem to be well attested by experience. We have multiplied remedies in many cases, hoping thereby to make it certain that some prescription will be within reach of every locality, that will be found adapted to the widely-varying conditions and temperaments of the human system:

Table of Doses of Medicines Prepared with Great Care.

Antimonial Wine (emetic) table-spoonful.
Balsam Copinba— $\frac{1}{2}$ a tea-spoonful
Blue Mass—5 to 15 grains.
Camphor—5 to 10 grains.
Calomel—2 to 10 grains.
Castor Oil—1 to 3 table-spoonful.
Chalk, Prepared—10 to 20 grains.
Chalk, Mercurial—5 to 20 grains.
Chloroform—30 to 60 drops (in syrup.)
Chlorate Potash—15 to 30 grains.
Composition Powder—1 tea-spoonful.
Croton Oil—1 drop (in pill or liquid.)
Cream of Tartar— $\frac{1}{2}$ to table-spoonful,
Dovers Powder—5 to 10 grains.
Dioscorein—1 to 4 grains.
Diaphoretic Powder—4 to 8 grains.
Elixir Vitriol—5 to 10 drops.
Emetic Powder, (Lob. Comp.)—1 tea-spoonful.
Ether, Sulphuric— $\frac{1}{2}$ a tea-spoonful.
Epsom Salts—1 to 2 table-spoonful.
Ergot, Powder—10 to 20 grains.
Essence Peppermint— $\frac{1}{2}$ to a tea-spoonful.
Fluid Extract Buchu—1 to 2 tea-spoonful.
Fluid Extract Uva Urea— $\frac{1}{2}$ to 1 tea-spoonful.
Gereanine—2 to 5 grains.
Hydrastine—3 to 5 grains.
Hive Syrup— $\frac{1}{2}$ to a tea-spoonful.
Hoffman's Anodyne— $\frac{1}{2}$ to a tea-spoonful.

Iodide Potassa—1 to 5 grains.
Ipecac, Powder—(emetic) 20 to 30 grains.
Jalap, Powder—10 to 20 grains.
Leptandrin— $\frac{1}{2}$ to 2 grains.
Laudanum—10 to 30 drops.
Macrotin— $\frac{1}{2}$ to 1 $\frac{1}{2}$ grains.
Magnesia, Calcined— $\frac{1}{2}$ to a table-spoonful.
Morphine— $\frac{1}{6}$ to $\frac{1}{4}$ of a grain.
Number Six—1 tea-spoonful.
Oil Peppermint—1 to 2 drops.
Opium, Powder—1 grain.
Paregoric—1 to 2 tea-spoonful.
Piperine—1 to 3 grains.
Podophyllin— $\frac{1}{2}$ to 2 grains.
Quinine—1 to 3 grains.
Rhubarb, Powder—10 to 20 grains.
Soda, Carbonate, 10 to 30 grains.
Sulphur, Powder—1 tea-spoonful.
Sugar of Lead—1 to 2 grains.
Syrup Squills—1 tea-spoonful.
Syrup Ipecac—1 tea-spoonful (for children.)
Syrup Rhubarb—1 to 2 table-spoonful.
Syrup Rhubarb, Spiced—1 table-spoonful.
Sanguinarian— $\frac{1}{2}$ to 1 $\frac{1}{2}$ grains.
Spirits Nitre—1 tea-spoonful.
Spirits Camphor— $\frac{1}{2}$ a tea-spoonful.
Spirits Hartshorn—10 to 15 drops.
Spirits Lavender, Compounded—a tea-spoonful.
Spirits Turpentine—5 to 20 drops.
Tartar Emetic (emetic)—1 to 2 grains.
Tannin—2 to 3 grains.
Tincture Asaetida— $\frac{1}{2}$ a tea-spoonful.
Tincture Cayenne— $\frac{1}{4}$ to a tea-spoonful.
Tincture Iodine—10 to 20 drops.
Tincture Iron (Muriate)—10 to 30 drops.
Tincture Lobelia—a tea-spoonful.
Tincture Rhubarb—2 to 4 tea-spoonful.
Tincture Valarian—1 tea-spoonful.
Tincture Bark—2 to 4 tea-spoonful.
Tincture Ginger—1 tea-spoonful.
Tincture Kino— $\frac{1}{2}$ to a tea-spoonful.
Wine, Colchicum—10 to 20 drops.
Wine, Ipecac— $\frac{1}{2}$ to a tea-spoonful.
White, Vitriol (emetic)—40 grains.

Ague in the Face.—Apply a poultice made of flour and ginger. Mustard poultice is also good, but it is apt to scar the face. Hops, steeped, and applied hot to the face, will often afford relief; or, a liniment composed of equal parts of spirits of camphor, laudanum, and aqua ammonia, or spirits of hartshorn.

Asthma.—Two ounces of best honey, and one of castor oil, mixed; a tea-spoonful night and morning. Or, an ounce and a half of sulphur, an ounce each of cream of tartar and pulverized senna, half an ounce of pulverized anise-seed, all well incorporated; dose—a tea-spoonful in a table-spoonful or two of molasses on going to bed, and occasionally, if required, during the day. Or, an ounce each of angelica, confrey, elecampane, spinknard roots, and hoarhound tops, bruised, and steeped in a pint of honey; dose—a table-spoonful taken hot, and frequently. In the hydropathic treatment, the rubbing wet sheet, pack and douche, with the chest-wrapper, are the leading processes.

Baldness.—This is caused by keeping the head too warm. To prevent thin hair and prema-

ture baldness, first, keep a clean scalp; second, never wear the hair on a strain, or against the direction of its growth; third, never apply anything to it but soap-suds or pure water; fourth, wear loose-fitting, soft hats; fifth, let men and children always wear the hair very short, and both men and women should brush the hair a great deal, using only a coarse comb, which should touch the scalp only in the slightest manner possible. When the hair is gone, and the scalp presents a shiny appearance, it can never be restored; but where such is not the case, the best treatment is to bathe the head in cold water, and follow it with a thorough rubbing and manipulation. Cases of cure have been effected by simply exposing the bare head to the sun's rays. A decoction of box wood has been used with success. Boil four large handfuls of the garden box in three pints of water, in a closely covered vessel, for fifteen minutes; then let it stand in an earthen vessel at least ten hours; then strain, and add an ounce and a half of cologne, and wash the head thoroughly every morning with this decoction.

Bilious Complaints.—Take forty drops of balsam of Peru on loaf sugar, every day, at the middle of the forenoon, as long as may be necessary.

Blistering from Lye.—Where a boy had fallen into a kettle of lye, presenting the appearance of blistering all over his body, he was washed well with vinegar, then greased with sweet cream. Not a blister filled, and his recovery was speedy.

Blistering Oil.—Put any quantity you may wish of Spanish flies in sweet oil; and soak a piece of cotton in it the size you may desire to blister. Camphor dissolved in sweet oil will make a good dressing for the blister.

Blood—Effusion of.—In cases of bleeding from the lungs or stomach, dry salt swallowed in small quantities, will at least arrest the flow of blood until other remedies for relief can be taken. Or, drink frequently an infusion of the pulverized or bruised root of crane's bill in water; it is a valuable Indian remedy, and acts promptly, and such is its worth, that it should be cultivated in every garden. Dr. JAMES WARREN'S remedy: Put two and a half drams of sulphuric acid in a mortar, and slowly add one fluid dram of the oil of turpentine, stirring it constantly with the pestle; then slowly add one fluid dram of alcohol, continuing to stir as long as any fumes arise from the mixture, then put it in glass, ground-stoppered, bottles. If the materials are good, it will appear like dark

blood; if poor, it will be of a pale dirty red, and unfit for use. Dose—forty drops in a tea-cup rubbed thoroughly with a tea-spoonful of brown sugar, and then stir in water till the cup is nearly full, and drink immediately. Repeat hourly for three or four hours, discontinuing when no more fresh blood appears.

For *nose bleed*, compress the artery furnishing the blood; if from the right nostril, feel with the fore-finger along the outer edge of the right jaw until you feel the beating of the artery, then press hard upon it for from five to ten minutes, when the ruptured vessel will probably by that time contract, and cease to leak. Another rolls up a piece of paper, and places it under the upper lip; while another simply puts a piece of paper in his mouth, and chews it rapidly for a brief season; and yet others check the bleeding by simply elevating the arm. A piece of ice laid on the wrist will often arrest violent bleeding at the nose.

To check the effusion of blood from a wound, use four or five drops of perchloride of iron, or half a tea-spoonful when a very large artery is severed. Or, apply finely-pulverized egg-shells to the bleeding wound. Or, take the fine dust of tea and bind it close to the wound; at all times accessible and easily obtained. After the blood has ceased to flow, laudanum may be advantageously applied to the wound. Or, if the cut be moderate, cover it all over with cobweb, or half and half of flour and salt. But if the blood comes from a wound in jets or spirts, be expeditious, or the person may die in a few minutes, because an artery is severed; tie a handkerchief loosely around near the part, between the wound and the heart; put a stick between the handkerchief and the skin, twist it around until the blood ceases to flow, and keep it there until the physician comes; if in a position where the handkerchief can not be used, press the thumb on the spot near the wound, between the wound and heart, increasing the pressure so as to stop the flow of blood, and glue up the wound by the conglutination or hardening of the cooling blood.

To stop bleeding after extracting a tooth, use spirits of turpentine in the mouth; if not at hand, use salt.

Blood Purifiers.—See Pills, Physic, etc.

Boils.—In their first stages, touch them with spirits of turpentine every six hours. Probably a preferable course is to take some such good blood purifier as a tea made of sassafras and burdock roots, with some good vegetable cathartic, followed by a few doses of sulphur

and cream of tartar. The water-cure treatment of the application of wet linen, frequently renewed, and kept at an agreeable temperature, lessens the pain, and is unquestionably excellent. The pain can also be lessened by living very abstemiously upon coarse bread and fruits, and by bathing and out-door exercise.

Bronchitis.—The universal symptoms are: A feeling of fullness, or binding, or cord-like sensation about the breast; a most harassing cough, liable to come on at any time; a large expectoration of a tough, stringy, tenacious, sticky, pearly or grayish-like substance, becoming a darkish, greenish, or yellowish color as the disease progresses. Croton oil, producing a counter-irritation, applied to the surface of the throat, one drop daily rubbed over the spot affected, causing an eruption on the skin, has often resulted in the restoration of the voice and health. The following water-cure treatment cured a person who had suffered severely seven months, having a bad cough and a frequent flow of blood: "In the morning I would get up, have a bucket of cold water poured over me, then jump into wet sheet and pack for an hour and a half—then another shower and rub off dry. At night a sponge-bath, and rub dry, and in four weeks I was entirely clear of every vestige of my complaint, and have been stout and healthy ever since."

Burning Clothes.—If your clothing takes fire slide the hands down the dress, keeping them as close to the body as possible, at the same time sinking to the floor, by bending the knees. This has a smothering effect upon the flames. If not thus extinguished, or a great headway is gotten, lie down on the floor, roll over—or, better, envelope yourself in a carpet, or rug, bed-clothes, or any garment at hand, always preferring woolen.

Burns or Scalds.—On the instant of the accident, suggests *Hall's Journal of Health*, plunge the part under cold water. This relieves the pain in a second, and allows all hands to become composed. If the part can not be kept under water, cover it over with dry flour, an inch deep or more. In both cases pain ceases because the air is excluded. In many instances nothing more will be needed after the flour; simply let it remain until it falls off, when a new skin will be found beneath. In severer cases, while the part injured is under water, simmer a leek or two in an earthen vessel, with half their bulk of hog's lard, until the leeks are soft; then strain through a muslin rag. This makes a greenish-colored ointment,

which, when cool, spread thickly on a linen cloth, and apply it to the injured part. If there are blisters, let out the water. When the part becomes feverish and uncomfortable, renew the ointment, and a rapid, painless cure will be the result, if the patient, in the meanwhile, lives exclusively on fruits, coarse bread, and other light, loosening food.

If the scald or burn is not very severe—that is, if it is not deeper than the outer skin—an ointment made of sulphur, with lard enough to make it spread stiffly on a linen rag, will be effectual. The leek ointment is most needed when there is ulceration from neglected burns, or when the injury is deeper than the surface. As this ointment is very healing and soothing in the troublesome excoriations of children, and also in foul, indolent ulcers, and is said to be efficacious in modifying, or preventing altogether, the pitting of small-pox, it would answer a good purpose if families were to keep it on hand for emergencies—the sulphur-ointment for moderate cases, and the leek-ointment in those of greater severity or of a deeper nature.

Dry flour is probably the best and most convenient remedy for burns ever used. Pulverized charcoal laid on the burn has sometimes stopped the pain instantly. White lead and linseed oil, rubbed up to the consistency of paste, make an excellent ointment for burns. The fresh-steeped leaves of green tea spread over an Indian meal poultice is excellent, and will extract powder when shot into the flesh. The whites of eggs have a soothing and curative effect, making a quick coating over the wound, and thus excluding the air. A paste made of sulphur and seal or other oil, or of soot and lard, applied with a feather; a strong solution of Epsom salts; a poultice of scraped potato; a solution of chloride of soda, four ounces to a pint of water, applied to the burn on lint; or alcohol used as a liniment, are all excellent. But the burned parts should be excluded from the atmosphere.

Burn Salve.—Simmer together till quite melted (stirring them well) a piece of Burgundy pitch the size of a hickory-nut, a piece of yellow beeswax of equal size, and a gill of sweet oil. When cool, spread some of the salve on a soft linen rag, and fasten it on the burn or scald, which, while the salve is preparing should be kept wet with sweet oil. Lime water, procured from the druggist's, and beaten up with sweet oil, is an excellent ointment for burns.

Cancer.—A gentleman of Wisconsin, who had a cancer cut out, which reappeared, and attained the size of a hickory-nut, had it cured in 1867, by resorting to the remedy of Dr. FELL, of London—a remedy used with eminent success in that great metropolis. A piece of sticking-plaster was put over the cancer, with a circular piece cut out of the center, a little larger than the cancer, and a small circular rim of the healthy skin next to it was exposed. Then a plaster made of chloride of zinc, blood-root, and wheat flour, was spread on a piece of muslin the size of this circular opening, and applied to the cancer for twenty-four hours. On removing it the cancer was found burned into, and resembled in color and hardness an old shoe-sole, and the circular rim outside of it appeared white and parboiled, as if scalded by hot steam. The wound was now dressed, and the outside rim soon separated, and the cancer came out in a hard lump, and the place healed up. The plaster killed the cancer, so that it sloughed out, like dead flesh, and has not since grown in again.

Take the common plantain leaves, bruise and cook them in sugar; strain this syrup, and take a tea-spoonful before each meal. This has been used with beneficial effects in cases of cancer.

An Indian remedy is to make a strong lye from red oak bark, and boil it down to a pulpy consistency, and apply it as a poultice direct to the cancer. In two or three days, or as soon as the pain ceases, the cancer can be removed entirely, by being very careful, as it will be found to have shriveled. The application will be very painful, but it has proved successful in all cases where faithfully tried. A person in Louisiana who had by this means cured a cancer on his face, had no return of it, and was still alive and well thirty years afterward.

Other remedies are: Boil up some poppy blossoms; and make a poultice by stirring in some meal or bran, or fine bread crumbs, and adding some beef's gall when the poultice is spread. When poppies are not in blossom, opium or laudanum will answer. Or, take a gill of gold or red litharge in a quart of vinegar, simmered down one-half; then add another pint of vinegar, and mix three table-spoonful of this liquid with a pint of soft water, and wash the cancer or fever sore, and in it frequently saturate the bandage for the diseased part. Or, boil Turkey figs in *fresh new milk*; apply the figs, split in two, while warm, to the cancer, three times in twenty-four

hours, washing or cleansing the cancer each time with the milk so boiled; and drink about half a pint of the milk twice a day for three or four months. The vitality of the cancer, it is contended, may be destroyed by the refrigerating process in two or three months. In any of these treatments thorough purification of the system, the purest diet, and strict attention to the general regimen are necessary.

To allay the pain of a severe cancer apply a pledget of lint soaked in a solution of citric acid, when the cancer is on the surface; and if in the mouth, throat, or stomach lemon or lime juice; or, if in the mouth or throat, a gargle composed of four grammes of citric acid in three hundred and fifty grammes of water.

Lobelia, syphilitica, or red lobelia, is very highly recommended as a cure for cancer in the breast of females—the decoction of the root to be drank daily, say a wine-glassful three or four times a day; and apply to the breast of cancer a poultice made of equal parts of elm bark and the powdered root or leaves, mixed up with the lobelia decoction, to be kept constantly applied, and the cancer washed with the warm decoction each time the poultice is changed.

Canker and Sore Mouth.—Use a strong decoction of bloodroot, sweetened with honey, and, after the canker disappears, wash with borax water to cool and heal. Or, a frequent wash with sage tea, with a little powdered borax and honey. Or, the frequent application of the tincture of nutgalls, diluted with an equal portion of cold water; or a tea made of the galls, and when cold wash or rinse the mouth frequently with it. Or, equal parts of barberry bark, Ohio kerkuma, bloodroot, and sage, sweetened with loaf sugar and honey. Or, take sumac berries or bark, blackberry root, goldthread, each one ounce; sage, two ounces; rose leaves, half an ounce; water, two pints; boil down to one-half, and strain; add honey one pint, and a little vinegar or lemon juice, and boil down to one pint; add, while hot, alum and borax, of each a piece the size of a cranberry. This is known to be a sure remedy for nursing sore mouths, or thrush. Or, make pulverized Indian turnip, mixed with honey, into a syrup; or, use raw barley, unground, steeped into a tea, and taken freely.

Catarrh.—Chronic catarrh is very prevalent in this country, and not often cured. Inhaling medications with an inhaler frequently results favorably. Finely pulverized saltpeter, mixed with two parts of white sugar reduced to flour,

snuffed up the nose a dozen times or more a day; or, a snuff composed of equal parts of pulverized bayberry, bloodroot, and Peruvian bark; or a decoction of white-oak bark, will all be found excellent. Snuffing salted water up the nose, at least on rising in the morning, has been found beneficial. Inhaling the vapor of a decoction of hops, catnip, hoarhound, and camomile flowers in vinegar, is recommended.

A Quaker correspondent of the *Country Gentleman*, while doubting a permanent cure, except in rare instances, suggests thoroughly washing with tepid or cold water the affected parts twice or more each day. How to reach the diseased spot with water, is the question, but happily it is not difficult to answer. A small syringe will do, but a *siphon* is much preferable, being more effectual and less likely to produce pain. The siphon should be an India rubber tube about four feet long, and about the size of small gas-pipe. Let one end be made heavy in some way, to keep it under water. Have the vessel of water somewhat elevated, on a shelf for instance, and having filled the tube, immerse the heavy end; hold the other end *low* over a suitable tub or basin until a steady flow of water is insured; then raising it until it throws only a very feeble jet, apply it to one nostril and insert as far as the tube will enter. Continue the application until the water flows from the *opposite* nostril and *allow* it to flow as long as you have patience to bear it.

A solution of permanganate of potassa, which any apothecary can furnish, is good to allay the offensive odor that often attends the disease. A grain of this to two quarts of water at *first*. The strength may afterward be increased.

Camphor Ice.—A delightful article to bathe exposed parts, to prevent chapping and sores from cold, is thus made: Take one pound of almond oil, one pound of rose water, one ounce each of wax and spermaceti, two ounces of camphor, and one ounce of rosemary. Melt the camphor, wax, and spermaceti in the oil by a gentle heat, then add the rose water, stirring briskly or rubbing in a large mortar, and lastly, the perfume. The consistence may be varied by increasing or diminishing the proportion of wax and spermaceti.

Colds, Coughs, Consumption.—Colds and consumption have their origin in going to bed with cold feet; standing on the street and chatting with a friend in a cool evening after a warm walk; standing without over-clothing in an open hall door, and lingering farewells with

a friend who has visited you; retaining wet garments on your person without exercising, or sitting in an open window of a warm room.

The best way to avoid catching a cold, says the *Good Health Magazine*, although it may seem a paradox, is not to be too much afraid of cold. Let one's accustomed exercise not be interrupted because it is damp, or even rains. Let these conditions be met by appropriate clothing, and let the feet be well protected by strong shoes. This rule must be observed, however, when one is out of doors, and the body feels cold from the clothes having become wet through, it is wrong to remain at rest. The danger of a sudden loss of animal heat is then imminent. Evaporation, although produced by heat, is very productive of cold, and it is greatly promoted by a current of air. It is on this principle that wine is often cooled for the table in hot climates. The bottles containing it are placed in a strong draught of air, while they are covered with a woollen material, which is kept constantly wetted. In this way wine can be obtained almost as cool as by means of ice. Now, in the case of a person whose clothes are wet and exposed to a gale, the conditions are exactly the same; instead of the warm wine, there is the warm body enclosed in a wetted covering. It is to be remembered, then, that the risk of catching cold from wet clothes is always greater in windy weather.

Cold may be taken, however, from moisture retained, as well as by that which is received. When perspiration is profuse, it saturates the inner clothes, and its chilling effects are soon felt if the body is kept at rest. The best mode of avoiding this is to wear clothes of loose texture in hot and dry weather, so that the escape of perspiration may be promoted as much as possible. Flannel, which has been adopted by cricketers as the most appropriate dress for their active game, is admirably adapted for this purpose. For the opposite reason, water-proof clothing is very objectionable, except when absolutely required to resist rain. Any one who has worn it while taking exercise will remember the uncomfortable state of dampness which it is sure to induce.

Many persons are extremely susceptible of cold from getting the feet wet or even damp. Fortunately it is in their power to guard against both by simple means; cork soles are very valuable preventives so far as concerns the bottom of the foot, and stout leather will insure sufficient protection for the remainder; but woollen socks, as being the best non-conductors of heat,

and withal the least liable to retain perspiration, are in such cases indispensable.

A valuable lesson may be learned, says the author of the *Army Surgeon*, from the fact that common colds were almost unknown in our army during the late war. Men were exposed to cold and wet long continued, so that during cold storms of Winter men often were wet as long as the storm continued, and until their clothing dried upon them when the storm ceased. If this proves anything, it proves the falsity of the complaint that one has been out too much and has caught cold. The truth is, he has been in too much.

You keep close by a warm fire with heavy clothing, on nearly all your time, and the first time you meet a blast of cold with all the pores of your body relaxed, and your whole system enervated by heat, you catch cold, and then comes ipecac, squills, and cough syrup, all because you have kept too near the fire, and then you say, I can't go out without catching cold. Take a dose of God's own cold air every day, and you will find time, money, and many a pain and ache saved; and if you will add good doses of cold water on the outside, you will find that heaven's pure air and earth's pure fountain are the best cures and the most certain preventives of disease.

The moment a man is satisfied he has taken cold, let him do three things: First, eat nothing; second, go to bed, cover up in a warm room; third, drink as much cold water as he can, or as he wants, or as much herb tea as he can; and in three cases out of four, he will be well in thirty-six hours. To neglect a cold for forty-eight hours after the cough has commenced, is to place himself beyond cure, until the cold has run its course, of about a fortnight. Warmth and abstinence are safe and certain cures, when applied early. Warmth keeps the pores of the skin open, and relieves it of the surplus which oppresses it, while abstinence cuts off the supply of material for phlegm which would otherwise be coughed up.

Consumption.—There is no malady which causes so large a mortality as consumption. Statistics show that throughout the civilized world an average of one death in six may be attributed to its agency. It was formerly considered an incurable disease, and was often left hopeless to run its fatal course unchecked; but modern investigation and science have proved that the tubercular deposit, to which all its dread results may be traced, will frequently diminish under suitable treatment. This is

further proved by *post mortem* examinations, where death has occurred from other causes, in which the lungs, scarred and puckered, attested the healthy closing of two, and even three, large tubercular cavities.

Few are aware how much the prevention, and even cure, of this dread disease depends upon their own efforts. An eminent American physician has recently declared, that with proper precautions, by any one in health, consumption will be well nigh an impossibility, even though hereditary influence may predispose him to it, and that even those who are already under its grasp may have hope of arresting its ravages. The plain and simple principle, which in this case is the essence of an all-wise treatment, is to raise the physical system to the highest possible vigor. In company with this, one of the best curatives and preventives is to expand and strengthen the lungs themselves by deep inspirations of breathing in of pure air. These inspirations should be made as slowly as possible through a small tube, or with the mouth nearly closed, and with the shoulders thrown back or downward. When the lungs or chest are filled, the air should be as slowly and gradually breathed out. By continual practice it will be found easy to take long inspirations, and the chest itself will become permanently expanded, so as to give the lungs full play. Where strength has begun to decline, of course the efforts must be proportionably milder. As the air at first enters the lower part of the lungs it only fills the apex after a long and sustained effort, and hence the necessity of making the inspiration as slowly as possible. Six times a day is not too much for this exercise.

Indeed, the great advantage of mild climates to consumptives is the possibility of passing so much of the time out of doors. Much is justly said of the pure and bracing air of Minnesota, but those who go there for lung diseases should remember that only as they breathe the pure outside air habitually can it prove beneficial. A lady with tubercular deposits, and severe cough, went there some time since, and a month spent in the ordinary way brought her no improvement. She then joined a camping party of ladies and gentlemen, who started in an open wagon, and slept in tents at night. After three days exposure to this open air she manifestly improved, and though frequently exposed in the evening took no cold. The continuance of this mode of life restored her health, and so strengthened her constitution that in two

months she could sleep with impunity while the air was blowing freely across her.* Many similar, and even more remarkable instances took place among the young men of our army in the late war, many of whom enlisted against the advice of their friends, and returned with greatly improved physical constitutions. The exercise thus induced is most essential to the desired end.

Abundance of nutritious and wholesome food, including fatty articles, is essential in the arrest of consumption. Most of those who have such tendencies reject fat meat, but its place may be supplied with butter, milk, or cream. Restriction in diet in these cases is highly injurious. The dress is also a matter bearing strongly on the health of the lungs. Woolen fabrics worn next the skin, and warm covering for the extremities, are all important. So also is the shape of the garment, which should allow full play to the muscles. Relief from care and anxiety, as far as it can be secured, is important.

It is the common belief, says an able medical writer in the *Atlantic Monthly*, that a dry atmosphere is the most favorable to the consumptive. Many medical authors have advanced this theory. It is nevertheless an error. In the British Isles and in France, outside the cities and manufactories, the mortality from pulmonary diseases is much less than among the agricultural classes of this country. And on the shores of this continent consumption is comparatively unknown.

Our disadvantage, in this comparison, is attributable, in considerable part, to the lack of humidity in our atmosphere. Without the evidence of facts we might argue that excessive dryness of the air would produce dryness and irritability of the air passages. From time immemorial, watery vapor has been used as a remedy in irritation and inflammation of the respiratory organs.

"A hundred times," he continues, "have my consumptive patients expressed surprise that the wet weather, in which I have insisted that they should go out as usual, has not injured them—that they even breathe more freely than on pleasant days. Of course, I tell them if the

body is well protected, the more moist the air, the more grateful to your lungs. There is no possible weather which can excuse the consumptive for keeping in-doors. Give him sufficient clothing, protect his feet carefully, and he may go out freely in rain, snow, and wind.

Dr. HALL's advice to consumptives is both pertinent and sensible: Eat all you can digest, and exercise a great deal in the open air to convert what you do eat into pure, healthful blood. Do not be afraid of out-door air day or night; do not be afraid of sudden changes of weather; let no change, hot or cold, keep you in-doors. If it is rainy weather, the more need for your going out, because you eat as much on a rainy day as on a clear day; and if you exercise less, that much more remains in the system of what ought to be thrown off by exercise, and some ill result, some consequent symptom or ill feeling, is the certain issue. If it is cold out of doors, do not muffle your eyes, mouth, and nose in furs, veils, woolen comforters, and the like. Nature has supplied you with the best muffler—with the best inhaling regulator—that is, two lips. Shut them before you step out of a warm room into the cold air, and keep them shut until you have walked briskly a few rods, and quickened the circulation a little; walk fast enough to keep off a feeling of chilliness, and taking cold will be impossible. What are the facts of the case? Look at railroad conductors, going out of hot air into the piercing cold of winter, and in again every five and ten minutes, and yet they do not take cold oftener than others; you will hardly find a consumptive man in a thousand of them.

It is wonderful how afraid consumptive people are of fresh air, the very thing that would cure them—the only obstacle to cure being that they do not get enough of it; and yet, what infinite pains they take to avoid breathing it, especially if it be cold! Yet if people can not get a hot climate they will make an artificial one, imprison themselves for a whole Winter in a warm room, with temperature not varying ten degrees in six months. All such people die, and yet we follow their footsteps. If I were seriously ill of consumption, I would live out of doors day and night, except when it was raining or midwinter; then I would sleep in an unplastered log house. My consumptive friend, you want air, not physic; you want pure air, not medical air; you want nutrition, such as plenty of meat and bread will give, and they alone. Physic has no nutriment; gasping for air can not cure you; and stimulants can not

* Professor HIND, in his interesting work on Labrador, gives this significant fact: Consumption appears to be all but unknown to the natives living wild in the fastnesses of this desolate region, in tents made of spruce branches, imperfectly lined with skins, and more or less exposed on all sides to the external air; although they are exposed to famine and every species of hardship. But when these same natives come down to the St. Lawrence to take a part in the fisheries, occupy well built houses, and being well paid, live in comparative luxury, most of them, in a year or two, become consumptive, and die miserably.

cure you. If you want to get well, go in for beef and out-door air, and do not be deluded into the grave by newspaper advertisements and unfindable certifiers.

Modes of Treatment.—The general hints and suggestions already given are probably of more practical value and utility to the consumptive than all the recipes we could add. Yet, some of the more simple and successful modes of treatment, briefly presented, may be very properly mentioned.

Raw-Meat Cure.—Dr. FOSTER, of Montpelier, France, treats pulmonic affections, and consumption in general, by a new method, which, up to the present time, has the most fortunate results. He makes his patients eat the flesh of raw mutton and of beef, and drink alcohol, weakened with water, in small doses. The meat, reduced to pulp, and disengaged from its tendons, is administered in balls rolled in sugar, or in sugared pulp in coffee-spoons, at the rate of one hundred, or three hundred grammes a day. If the thirst of the consumptive is intense, it is slackened by a drink composed of five hundred grammes of cold water with sugar, in which one hundred grammes of the pulp are dissolved. The alcohol portion is composed of alcohol at twenty degrees Baume, increased to three times its volume by sugared water. It is taken by the spoonful from hour to hour. This new medication has succeeded in some cases beyond all expectation. Persons affected with serious phthisis, or with phyohenna (the blood mingled with pus), have been radically cured. Raw meat has a reconstructive power, while alcohol acts directly upon the organs of hæmotosis or sanguification—the production of blood.

Arsenic Cure.—The celebrated physician, Dr. LONDE, asserted, in the French Academy of Medicine, that he had found but one successful means of combating the dreadful disease, tubercular consumption, and that means was the smoking of arsenic, and strongly commends the remedy. Missionaries and others who have long resided in China, agree in stating that smoking tobacco, free from arsenic, is not sold in that country, and that the arsenic smokers were stout fellows, "with lungs like a blacksmith's bellows," and cheeks as rosy "as cherubs."

Iodine Remedy.—Inhaling iodine is strongly recommended for lung diseases. A medical writer in the *Philadelphia Ledger* cites several strong cases in which this simple remedy has been tried with success. It is stated in the *New York Sun*, that one of its subscribers who

had been afflicted with consumption and its attendant evils, mixed one part of chloride of iodine with six parts of water, and kept it in his bed-room, in a partly covered dish, for a fortnight, during which time his health so sensibly improved that he could not refrain from giving publicity to the fact.

Iron and Calisaya Remedy.—The late Rev. JEREMIAH DAY, President of Yale College, was compelled, from pulmonary difficulty, at the age of seventeen, to leave college, but rallying, he re-entered, and graduated. In 1801, when chosen a Professor in Yale, he was prostrated with an alarming hemorrhage of the lungs, went a while to Bermuda, but returned home to die. But meeting with Dr. SHELDON, of Litchfield, the latter expressed his belief that he could help him; when Mr. DAY placed himself under the doctor's care, was treated with iron and calisaya bark, with a careful regimen of wholesome food. He at length recovered, and never after exhibited any pulmonary symptoms, and lived to the great age of ninety-five years. After his death it was found that his lungs were entirely free from tubercles, but in the apex of each lung was discovered a dense, corrugated circular cicatrix, an inch and a half or more in diameter; also a third circular cicatrix, of the same diameter, on the left side of the left lung—the scarred evidences of a disease of twelve years' duration that had been completely cured.

Potassa Remedy.—Liquor potassa, twenty or thirty minims, three times a day for an adult, in some bland fluid, is a new treatment for tuberculous phthisis, or consumption, which has proved beneficial.

Arseniate of Soda Remedy.—A recent successful French treatment, in cases where a cough, accompanied with blood-stained expectorations, had been going on for a year, is to administer daily six milligrammes of arseniate of soda for twenty days consecutively; and then give cod-liver oil alone for the next sixteen days, and so on alternately from three to seven months, the patient taking at the same time infusions of quassia and wine of Jesuit's bark.

Water-Cure Treatment.—Incipient cases of tubercular consumption are often treated successfully by the wet-sheet pack, with the half bath on alternate mornings, the spray bath in the afternoon, and the sitz bath toward night, followed by manipulation of the chest and abdomen—with several occasional vapor baths. For long-continued chronic expectoration, with tightness, soreness, and pain about the lungs,

take a daily sponge bath, one or two hip baths, and the chest-wrapper, using only a very abstemious vegetable diet.

Other Remedies.—A seaton or issue is frequently beneficial. Add an ounce of subcarbonate of potash to a pound of tar, and place this in a vessel over a spirit lamp, and boil slowly so as to prevent burning; and when cool enough to do so, inhale the vapor frequently.

One or two ounces of gum ammoniacum, prepared in a pint of good vinegar, well sweetened with honey, is an excellent medicine for consumptives.

Boil an ounce and a half of Iceland moss slowly in a quart of sweet milk fifteen minutes, and drink a tea-cupful three or four times a day. If milk disagrees with the stomach, use water instead, adding two drams of liquorice root ten minutes before it is done.

Take four parts of pulverized crawley root, and one part each of pulverized skunk cabbage root, wild turnip, and elecampane root, mixed with molasses; take a large tea-spoonful three or four times a day. If a coughing spell threatens to come on, take a little pulverized leaf of lobelia on the point of a penknife, and drop it in a spoonful of water, and drink it, and you will soon be able to raise without coughing or straining. If fever comes on, drink half a tea-cup of strong nannybush tea, three or four times a day. For pain in the side, drink half a tea-cup of strong boneset or thoroughwort tea on rising in the morning, intermitting it a few days, and then renewing it again. A glass of lime water may be occasionally used. For costiveness, take two tea-spoonfuls of whole mustard seed twice a day.

After the cough and pain in the side have disappeared, use beer made as follows: Pour six pails of boiling hot water into half a bushel of barley malt; let it stand six hours, then drain it off, adding to the liquid half a bushel of white-pine bark, a pound each of well-bruised spikenard root, root and top of black-snake root, comfrey, Iceland moss, liquorice, and white-oak bark; boil down one-half, strain it into a new keg or clean jug, add a pound of honey and yeast; after fomenting, bottle, and use a gill at a time, three or four times a day, gradually increasing the quantity.

Cold in the Head.—Here is the remedy of Dr. PALON, of France, for a cold in the head: Inhale hartshorn. If the sense of smell is completely obliterated, the bottle should be

kept under the nose until the pungency of the volatile alkali is felt. The bottle is then removed, but only to be re-applied after a minute; the second application, however, should not be long, that the patient may bear it. This easy operation being repeated seven or eight times in the course of five minutes, but always very rapidly, except the last time, the nostrils become free, the sense of smell is restored, and the secretion of the irritating mucus is stopped. This remedy is said to be peculiarly advantageous to singers.

Another French remedy is, inhaling the tincture of iodine, a phial of which is to be held in the hand and placed under the nose. The warmth of the hand enclosing the phial causes the vaporization of the tincture. The inhalations are to be made every three minutes, and soon all symptoms of the malady will cease.

Congestion of the Lungs.—A napkin wrung out of hot brine, and laid over the chest, changing it as soon as cool, will give great relief.

Remedies for Colds and Coughs.—At night, thoroughly soak the feet in as warm water as may be borne; then put bountiful drafts on the feet, by this means keeping them as warm as possible.

Water-gruel, with three or four onions, simmered in it, with a lump of butter, pepper, and salt, eaten just before going to bed, is said to be a cure for a hoarse cold. A syrup made of horseradish root and sugar is excellent for a cold.

Take into the stomach, before retiring for the night, a piece of raw onion, after chewing. In an uncooked state, this esculent is very heating, and tends to collect the waters from the lungs and throat, causing immediate relief to the patient.

A syrup made of onions has cured many a child of a severe cold, and saved many a one from an attack of croup or lung fever. To prepare the syrup, slice an onion in a tin basin, pour upon it half a tea-cupful of molasses, or, what is better, honey; add a bit of butter as large as a small chestnut. Set the dish in the oven, and simmer slowly for an hour. Leave one of the oven doors open, so that it will not be too hot.

One large spoonful of flaxseed, five cents worth of liquorice, and four ounces of raisins. Boil these in two quarts of rain or soft water, till reduced nearly one-half. Add five cents worth of hoarhound or barley candy, or half a

tea-cupful of brown sugar, and a little vinegar or lemon juice. Drink a cupful at bed-time, and take a little whenever the cough is bad.

Boil half a pint of milk, a small bit of butter, and a tea-spoonful of black pepper. Drink it hot on going to bed, and repeat, if needed, three or four nights.

Take two ounces each of brandy or alcohol and gum arabic, and one ounce each of honey and the tinctures of lobelia, bloodroot, and liquorice. Dissolve the gum, liquorice, and honey in a gill and a half of water, and add to the others, mixing them well. Take a tea-spoonful at a time, three times a day. A gentleman of Cincinnati who was cured by this syrup of a bad cough, presented his benefactor with fifty dollars.

To two quarts of rum, add half a pint of molasses, one gill of tar, and warm and melt together. Take from one to one and a half table-spoonful at a time, three times a day.

Two ounces of golden seal or Ohio kerkuma, or yellow poccoon, or tumeric root—known by all these various names—pulverized and put into a pint of whisky; after standing for a week, take a tea-spoonful at a time three times a day.

Make a strong decoction of white-oak bark, and drink three times a day about half a tea-cup of it; immediately after eat a piece of salt-peter the size of a kernel of corn, following it with a piece of resin the size of a hazle-nut. At the same time bathe the stomach three times a day with the oak decoction, until the pain and fever disappear. Decided benefits will be seen and felt in a few days, even in cases of consumption. Speaking of a case coming within his knowledge, the late Judge DRAPER, of Toledo, Ohio, said: "The improvement made in a short time was truly astonishing—greater than anything I ever saw or heard of."

To a pint of best brandy or alcohol add half an ounce of oil of anise, and one ounce each of balsam of tuln and liquorice ball, or extract of the ball, made fine; when well mixed, take a tea-spoonful at a time, if the cough is bad, six or eight times a day.

Beat well together in a mortar a quarter of an ounce each of fresh squills, gum ammonia, and powdered cardamom-seeds; if too hard add a little of any kind of syrup, then make into common-sized pills, four or five of which may be taken two or three times a day, as the patient can bear them.

Four ounces each of lemon juice, strained honey, and syrup of poppies, simmered together

over a slow fire. Take a table-spoonful at a time when the cough is troublesome. In connection with this medicine, use bitter drinks to promote the digestion, such as Peruvian bark, gentian root, camomile flowers, and hoarhound, infused in water or wine and used freely; diet light, using sweet milk and buttermilk plentifully with frequent horseback and other exercise. This treatment has resulted favorably in many almost hopeless cases.

Take equal quantities of turpentine and bees-wax, burn them slowly in an earthen or iron dish, placing a tin funnel over the dish, the large part down, so as to inhale through the tube into the lungs the evaporated matter three times a day for three days, then intermitting three days and then resuming the operation again until a cure is effected. Immediately after each application take some good cough drops and also whenever the patient coughs. This is an Indian remedy.

Two pounds each of good raisins and strained honey in a gallon of good brandy, taken in moderate quantity several times a day, has proved of much benefit; and even a good article of whisky alone has been frequently known to effect a cure.

Take ten drops of Venice turpentine on sugar three times a day, and gradually increase the quantity to twenty drops, which continue till better, and then gradually decrease. This is excellent for weak or sprained lungs, cough, and has been recommended for liver complaint.

Take one ounce each of thoroughwort or boneset, slippery elm, liquorice stick, and flax-seed; simmer together in one quart of water until the full strength of all the ingredients is extracted; strain carefully, and add one pint of good honey or syrup and half a pound of good loaf sugar, and simmer them all well together. Bottle tight; good for asthma, colds, and coughs; a table-spoonful for a dose.

Boil one quart of good cider vinegar down to a pint, then add one pound of loaf sugar, two ounces of liquorice ball or stick, two large lemons sliced up, all slowly boiled or simmered together half an hour; when cold add half an ounce of laudanum. Take a table-spoonful at a time three or four times a day; and if the cough is troublesome in the night, take a tea-spoonful at a time as required during the night.

Pulverized Indian turnip, mixed with honey or syrup, is a good remedy for coughs.

A common and most effective remedy for colds, is a mixture of butter, vinegar, and molasses, stewed together and taken hot. A case

of settled cough, soreness, and bleeding of the lungs coming under our observation, was cured by heating together equal parts of butter and brown sugar, and eating as much of it as could be taken hot on going to bed, and repeating it a few times.

Four ounces each of sunflower-seed, wild cherry bark, and buds of the balm of Gilead; and one ounce each of hoarhound herb, slippery-elm bark, and blacksnake root, in four quarts of water, simmer to one-half; then strain, and add one pound of loaf sugar, and a pint of best brandy. Take half a wine-glass three or four times a day.

Take a pound and a half each of spikenard root, hoarhound tops, elecampane root and comfrey root, and boil them into a strong decoction of eight quarts, and then add twelve pounds of white sugar, six pounds of honey; clarify with the white of eggs, and add one quart of good brandy. Then let it stand for twenty-four hours, and bottle it for use. A wine-glassful three times a day, is a dose. It is very useful in chronic catarrhs and colds, dry coughs, and pulmonary diseases generally.

To thirty drops of laudanum add twenty-five drops of ipecac wine, and mix with a dessert-spoonful each of vinegar and honey, for a dose.

Take an ounce of the syrup of white poppies, half an ounce each of paregoric elixir and tincture of squills, and a quarter of an ounce of tincture of tolu, and mix. Dose—a tea-spoonful in barley water when the cough is troublesome.

Thomson's Cough Syrup.—Take of poplar bark and beth root, each one pound, water nine quarts; boil gently in a covered vessel fifteen or twenty minutes; strain through a coarse cloth; add seven pounds loaf sugar, and simmer until the scum ceases to rise. When the syrup is nearly cold add one pint of tincture of lobelia and one gallon of pure French brandy. Dose—a table-spoonful three or four times a day.

A Water-Cure Cough Recipe.—Place a glass or cup of pure soft water within reach, and whenever inclined to cough, or feel an irritation or tickling in the throat, take a swallow or sip, with a determination not to cough. Continue this perseveringly, and the most vexatious cough will be removed speedily.

Resin Aroma for Cough.—A small piece of resin dipped in water placed in a vessel on a stove (not an open fire-place), will add a peculiar property to the atmosphere of the room, which will give great relief to persons troubled with a cough. The heat of the stove is suffi-

cient to throw off the aroma of the resin, and gives the same relief that is afforded by the combustion, because the evaporation is more durable. The same resin may be used for weeks.

Cough from a Recent Cold.—Equal parts of Jamaica rum, honey, and linseed oil. To be shaken when used.

A Dry Cough.—Dissolve half an ounce of powdered gum arabic in warm water; squeeze in the juice of a lemon, and add one dram of syrup of squills, and two of paregoric. Keep well corked, shake well, and take a tea-spoonful whenever the cough is troublesome. Or, equal quantities of pulverized sage and loaf sugar, well mixed, taking a tea-spoonful whenever a disposition is felt to cough. Or, use a little dry salt as a gargle.

To Cure Hoarseness.—Take the whites of two eggs and beat them with two tea-spoonsful of white sugar; grate in a little nutmeg; then add a pint of lukewarm water. Stir well and drink often. Repeat the prescription, if necessary, and it will cure the most obstinate case of hoarseness in a short time. Chewing horseradish is also good. Strong elecampane tea is regarded as efficacious.

Troches for Coughs and Colds.—Four ounces each of sugar and powdered extract of liquorice, one ounce of powdered cubebs, and a quarter of an ounce of sal-ammoniac, with gum arabic and water sufficient to form into troches.

Expectorant Candy.—Take one dram each of bruised ipecac and squills; one ounce each of elecampane and comfrey bruised; boil the whole in two quarts of water until reduced to one-half, then form into candy with sugar.

Over-Drinking Cold Water.—A napkin, saturated with boiling water, spread upon the stomach of one apparently dying from the effects of drinking cold water in hot weather, affords almost instant relief.

Cholera Precautions.—Among the precautions recommended by the British Government, are the following:

“Sources of water supply should be well examined. Those which are in any way tainted by animal or vegetable refuse; above all, those into which there is any leakage or filtration from sewers, drains, cesspools, or foul ditches, ought no longer to be drank from. Especially where the disease is cholera, diarrhea, or typhoid fever, it is essential that no foul water be drank.

“The washing and lime whitening of uncleanly premises, especially of such as are densely

occupied, should be pressed with all practicable dispatch.

"Overcrowdings should be prevented. Especially where disease has begun, the sick room should, as far as possible, be free from persons who are not of use or comfort to the patient.

"Ample ventilation should be enforced. It should be seen that window frames are made to open, and that windows are sufficiently opened. Especially where any kind of infective fever has begun, it is essential, both for patients and for persons who are about them, that the sick room and the sick house be constantly well traversed by streams of fresh air.

"The cleanliest domestic habits should be enjoined. Refuse matters which have to be cast away should never be let linger within doors; and things which have to be disinfected or cleansed should always be disinfected or cleansed without delay.

"Special precautions of cleanliness and disinfection are necessary with regard to infective matters discharged from the bodies of the sick. Among discharges which it is proper to treat as infective are those which come in cases of small-pox, from the affected skin; in cases of cholera and typhoid fever, from the intestinal canal; in cases of diphtheria, from the nose and throat; likewise, in cases of any eruptive or other epidemic fever, the general exhalations of the sick. The caution which is necessary with regard to such matters must, of course, extend to whatever is imbued with them, so that bedding, clothing, towels, and other articles which have been in use by the sick do not become sources of mischief, either in the house to which they belong, or in houses to which they are conveyed. Moreover, in typhoid fever and cholera, the evacuations should be regarded as capable of communicating an infectious quality to any night-soil with which they are mingled in privies, drains, or cesspools, and this danger is best guarded against by disinfecting them before they are thrown away; above all, they must never be cast where they can run or soak into sources of drinking water."

Cholera never attacks the body, says *Hall's Journal of Health*, except in its time of weakness; hence, as from the fast of the previous twelve or more hours, the body is weakened, breakfast should be taken before going outside the door in cholera times, as it gives a power of resistance against the poisonous qualities of an infected night air, and for the same reason, when the body is weak and tired by the labors

of the day, it should not only be kept from the night air, but should be fortified by a warm and early supper.

Exposure to the hot sun of a Summer mid-day should be avoided, nor should any labor or occupation be continued until exhaustion. The time to stop work is when the feeling of tiredness first begins to force itself upon the attention.

Eat only plain nourishing food, such as meat, bread, rice, the starches, with milk, eggs, oranges, and lemons. As fruit and vegetables in cities are sure to be more or less stale before they can be used, it is better to discard them altogether. Do not overload the stomach.

Personal cleanliness is imperative, and needs scarcely to be insisted on. But all these things are useless against uncleaned houses and yards. Each householder should make it a matter of conscience to keep his dwelling and place of business scrupulously clean from cellar to attic, and from the middle of the street to the rear of his lot.

Do not let the mind be perplexed by questions as to the contagiousness, or portability, or the infectious nature of the cholera, or as to the value of a quarantine, for none of these things will, of themselves, prevent an attack of cholera in any case; but bear in mind always, that perfect and infallible exemption will be the result of personal and domiciliary cleanliness, of a plain and regular mode of living, and of a composed, confident, and fearless mind.

Cholera Symptoms.—Cholera has two stages—a premonitory or mild stage, and a stage of collapse, which is fatal. The premonitory stage is ushered in by a mild, painless diarrhea, which generally continues for hours, sometimes for days, before the stage of collapse sets in. In this premonitory stage the disease is readily and promptly curable by simple remedies, combined with rest in the recumbent position. All that is necessary, therefore, to prevent a fatal attack of cholera, is that the patient shall lie down, keep warm and quiet, and take such remedies as will relieve the diarrhea.

Cholera is invariably preceded by lassitude, great languor, debility, and diarrhea; in this stage it can be controlled and checked. But at the very first approach of the diarrhea, the patient should assume the horizontal posture, and retain it, with his hips higher than the shoulders, and under no circumstances assume the perpendicular, even for a moment. Absolute, positive rest is needed, the body being kept in warm condition by every artificial means

that can be used to that end. If the patient, when taken, is away from home, let him remain there; if down stairs, let him stay there, or be carried up—not walk up under any plea. Maintaining the horizontal position for forty-eight hours, in the majority of instances, the disease will pass over. On recovery, he need make no very great changes in his mode of life, except, if he has bad habits, he should reform them; eat and drink rationally, attend to his business as usual, be “temperate in all things,” and not over-do himself.

A few of the more reliable remedies will now be mentioned. A bag of broken ice applied along a narrow strip—not more than four or five inches broad, in the adult—down the very center of the back; continued along the whole spine until the cramps are subdued, and then along the lower half of the spine until vomiting and purging cease, has been practiced with much success. Dr. ARONSON, of Marseilles, has had remarkable success in his mode of treatment—contending that the cholera produces a superabundance of oxalic acid in the system; to prevent which, he administers alkaline salts, such as bicarbonate of soda, which decomposes the oxalic acid.

Dr. A. DE GRAND, of France, after the experience of fourteen cholera epidemics, thus advises the public: The general rule in time of epidemics should be to pay the strictest attention to the patient's bowels. If the evacuations be formed of aqueous matter, similar in appearance to very clear *café au lait*, to rice water, to dishwater, or to tea stirred with a few drops of milk, then, whatever be the condition of the patient, although he may be suffering neither from pain nor weakness, he has the cholera. The progress of the disease has then to be arrested by the use of peppermint, of which the patient must drink half a cupful every quarter of an hour; it is to be taken quite hot, sweetened, and with the addition of two table-spoonsful of rum or old cognac, together with twenty drops of tincture of cinnamon. Perspiration is then produced, and the infusion is continued till the motions are checked. Three hours generally suffice for this. If the medicine thus administered promote signs of intoxication, this is to be regarded as a favorable sign of recovery; if it cause vomitings, then it is to be discontinued, and a small glass of old cognac is to be substituted in its place, which is to be taken every quarter of an hour. When the disease has reached its crisis, it is generally necessary to

confine the treatment mainly to alcoholized aromatics, energetic frictions, injections not too strongly etherized, rubbing of the limbs, and to use every suitable means for increasing the circulation, and exciting the nervous system.

Asiatic Remedies.—“To stop cholera-diarrhea,” says the Rev. Dr. CYRUS HAMLIN, American missionary at Constantinople, “administer a mixture composed of equal parts of laudanum, spirits of camphor and tincture of rhubarb. It is effective in doses of thirty or forty drops, though in urgent cases the amount may be doubled. I have had but few cases in which it failed, and then I gave laudanum and starch injections. During the prevalence of cholera never fear to push medicine boldly until the diarrhea is controlled; then be careful. Decrease the amount of the mixture, giving twenty-five, twenty, fifteen, ten, and five drops, at intervals of four hours' distance, and the patient will soon be well. For injections I use forty drops of laudanum, in a small quantity of starch (say four table-spoonsful) and add ten drops each time. I once used a tea-spoonful the sixth repetition, and the patient recovered. Laboring people here endure enormous doses. I have used the above mixture twenty-six years, and have found nothing else so effective. The camphor and rhubarb seems to be an antidote to the excessive amount of laudanum. A young American procured an ounce of it, and being attacked took one-half of it at a dose, and six or eight hours afterward took the remainder, and recovered.

For vomiting, or vomiting and diarrhea, our reliance is a mixture of equal parts of laudanum, tincture of capsicum, tincture of ginger, and tincture of cardamom seed. For the latter tincture of camphor may be substituted. Our tinctures are not very strong, and we have given from one-half to a whole tea-spoonful for a dose. If strong, the first is the maximum quantity. With this we use mustard poultices freely, applying them to the stomach and bowels. They aid to arrest the vomiting.

In this disease the thirst is often uncontrollable, *but if the patient drink water he will die.* Wash the mouth often, drink a little camomile tea and a little gum water, just to moisten the mouth and the throat often, and in most cases the suffering will greatly moderate in twenty-four hours.

Some severe cases take on the typhoid condition. We use nothing but camomile tea, with a little sweet spirits of niter, or couch-grass tea, arrowroot, with a little brandy, etc.

Innoculating the patient with quassia—making a small incision in the arm, and rubbing the quassia liquid into it—even when sinking rapidly, has restored thousands in Asia. Clo-rydine is extensively used before collapse has taken place—quassia after. For the discovery of the quassia specific, the government of India granted Dr. HONINBURGER a pension of £120 per annum.

Hon. JOHN P. BROWN, who for many years represented our government at Constantinople, says the cholera can be carried from one place to another by an individual whose garments are infected, or who has the disease in his person. If a person attacked be secluded and the infectiousness of his discharges be destroyed by lime, the extension of the disease will be arrested.

A mixture of equal portions of laudanum, camphor, and rhubarb, with perhaps a little peppermint, is highly efficacious in the first stages of the attack. Of this, twenty or thirty drops should be given in a little brandy, wine, or water, and repeated after each evacuation, according to the circumstances and strength of the patient. He should lie down, and his extremities be kept warm by friction with flannel, dipped in camphorated spirits. Mustard plasters may be applied to the abdomen with advantage, if necessary. Bismuth and quinine are found useful; indeed almost anything that warmed the interior of the stomach, such as the essence of ginger, hot brandy, etc., frequently, sufficed to check the disease in its first stages.

Dr. P. B. RANDOLPH, the distinguished American author and traveler, while in Europe and Egypt, in 1861-'62, had many cases of genuine Asiatic cholera come under his observation, and has known the following treatment tried with unvarying success:

Best French brandy, one pint; cayenne pepper, one quarter of an ounce; sweet spirits of niter, one ounce; fluid extract of Cannabis Indica, half an ounce. Keep in tight, glass-corked bottles.

When the patient is attacked, put him to bed instantly; give one table-spoonful of the mixture in a gill of sweetened warm water every half hour till the symptoms cease, which will be the case when the patient perspires freely. Then let him be towel-bathed in warm water, four quarts, in which a little soda-ash has been dissolved. If the disease has reached the second or cramp stage, increase the dose and shorten the intervals one-half. Pound some

ice, roll it in a towel, and lay it along the spinal column, or backbone; or, what is infinitely better, lay a roll of cotton, steeped in chloroform, along the spine, instantly covering it with oiled silk, to prevent the least evaporation. In three minutes, if this be properly done, the patient will experience very peculiar, and, perhaps, unpleasant sensations. Let this be kept on ten minutes, and unless the symptoms abate, repeat it, both on the back and across the abdomen.

Dr. HERRING, of Philadelphia, says the surest preventive is sulphur. Put half a tea-spoonful of flour of sulphur into each of your stockings, and go about your business; never go out with an empty stomach, eat no fresh bread nor sour food. This is not only a preventive in cholera, but also in many other epidemic diseases. Not one of many thousands who have followed this advice has been attacked by cholera.

Dr. VELPEAU, an eminent French surgeon, says the cholera has its origin in some poison introduced into the organism. The means of arresting the malady at its outset are very simple. "My advice is this: Pour from three to four drops of laudanum on a lump of sugar and swallow it. Repeat in two hours afterward, and so on, until the colic and vomiting pass away. Take also very small injections of starch, poppy flowers, with six, seven, eight or ten drops of laudanum. This treatment will almost always suffice to stop the diarrhea, and will be a guaranty against the malady."

The following remedy has been used with success: Laudanum, two ounces; spirits of camphor, two ounces; tincture of capsicum, half an ounce; tincture of ginger, one ounce; Hoffman's anodyne, two ounces. If the anodyne can not readily be obtained, substitute sulphuric acid. Mix thoroughly, and shake well every time it is used. Give or take from ten to twenty-five drops, according to age, condition, and violence of the attack. Repeat every twenty minutes till relief is obtained. In a desperate case, take a table-spoonful at once. Take it in an equal quantity of water, and lie on the back quietly till it has full opportunity to work. Carry a small phial in the pocket when cholera prevails, with a few lumps of white sugar upon which to drop it, to be used in sudden emergencies.

We give the following long-tried and excellent remedy: Mix equal parts of the tincture of opium (laudanum), tincture of rhubarb, tincture of capsicum (red pepper) double strength, tincture of camphor, spirits sweet niter, essence

peppermint, double strength. Then shake all the ingredients together, cork the bottle, and have it ready for instant use. It will keep for years. Dose—for an adult, from five to thirty drops, according to constitution and severity of symptoms, every fifteen minutes. For children give proportionally smaller doses, say two, four, six, eight or ten drops, as the case may seem to require, in a little sweetened water.

A pill composed of four parts of sulphur and one of charcoal—one taken every two or three hours has produced the most successful results—in some cases of the worst stages of collapse. A decoction of prickly ash berries has proved of the highest importance in cholera cases in Western hospitals.

Another excellent cholera medicine: To one quart of best alcohol, eighty or ninety per cent. above proof, add one ounce gum myrrh, one ounce cloves, one ounce gum guaiacum, and one ounce capsicum (better known as African cayenne); all to be pulverized. To be well shaken up two or three times a day for a week or more, if time will permit; if wanted quickly, then shake it frequently a few hours. Then to be poured off and strained, and returned to a clean bottle; when add one ounce gum camphor, quarter of an ounce of oil peppermint, quarter of an ounce of oil of cinnamon, and an ounce and a half of laudanum. All to be well shaken to cut the oils and gum. From half a tea-spoonful to two tea-spoonful, according to circumstances, for a dose, reduced and sweetened. Take also this preparation mixed with a fourth or third as much of spirits of turpentine, and rub the wrists, ankles and upper part of the feet. Place bottles of hot water around the body, which, with the external application, is to produce perspiration.

This preparation is also excellent for all cases of bowel complaint, pain in the stomach, or external pains and for headache.

Pain Killer for Cholera, Bowel Complaints, etc.—Pulverize one ounce each of gum guaiacum, gum myrrh, and African cayenne pepper, and cloves; and put them into one quart best alcohol, eighty or ninety per cent. above proof, and shaken up two or three times a day for a week or more, if time will permit; if wanted sooner, shake it frequently for a few hours; then pour off and strain, cleansing the bottle or jug, and returning the liquid. Add one and a half ounces laudanum, one ounce gum camphor, and a fourth of an ounce each of oil of peppermint and cinnamon; shake well to cut the oils and gum. From one-half to two tea-spoonful a

dose, reduced and sweetened. For cholera cases, take some of the pain killer and add a fourth or third as much spirits of turpentine, and with this thoroughly rub the wrists, ankles and upper part of the feet; and put bottles of hot water around the body—these to produce perspiration.

We can, of our personal knowledge, vouch for this as an invaluable preparation, not only for cholera and bowel complaints, but also for pain in the stomach, external pains, and fits. For headache, wet a paper or cloth, and bind it on the head.

Choking.—Infants often become choked by getting things or food in the throat. When it occurs, the child should be placed in the lap, face down, while it is gently struck a few times on the back and shoulders, if this does not remove it put the forefinger into the mouth and extract it.

Colic.—1. Cases which would, in all human probability, have proved fatal in an hour or two, have been speedily cured by this treatment: Put alcohol in a spirit lamp, or in a tin pan with a cover in which are several punctured holes, and wicks inserted, and the patient placed in a chair, covered to his chin with a blanket, and the burning alcohol placed near the feet, giving him, meanwhile, some warm drink or stimulant to promote perspiration, and when he shows decided signs of fainting, place him in bed and cover carefully.

2. Place the patient's feet in warm water as soon as possible after taken with this painful and dangerous disease. Apply stimulating liniment to the surface. If no liniment is at hand, in its stead apply flannel cloths wrung out of hot water, or where some sweating herb has been boiled, and give the patient one table-spoonful of sweet oil, once in ten minutes, until relief is found. It seldom requires more than the third dose.

3. Dried and powdered Indian turnip, given in tea-spoonful doses, is a valuable remedy.

4. The water-cure treatment of one or two full injections of warm or tepid water will generally suffice, but in severe cases, many gallons of water are given at the mouth to cause vomiting, and the bowels to clean them of their contents. Also cold sitting baths with a good deal of rubbing of the bowels with the wet hand. Cold and warm baths may be used alternately with advantage. Keep the feet warm.

To Arrest the Fatal Effects of Chloroform.—An eminent surgeon of France relates two cases in which the inhalation of chloroform proved

nearly fatal, he, however, succeeded in reviving his patients, after all ordinary means had failed, by placing his mouth upon theirs and forcibly inflating the lungs by rapid aspirations and expirations. A medical practitioner in Paris states that in two instances of approaching dissolution by the inhalation of chloroform, he recalled life by thrusting two fingers deep into the throat, down to the larynx and œsophagus, a sudden movement of expiration followed, and recovery took place.

For Chlorosis or Green Sickness.—For this disease of the young girl, give one and a half grains of sulphuret of iron, morning and night, in water. Bathe the feet at night in warm water, the patient drinking some warm tea, as sage, pennyroyal, etc.

Congestion of the Brain.—The water-cure treatment is probably as good and convenient as any. Use such baths, frictions, and manipulations, as will call the blood and nervous influence from the congested parts to the skin, muscles and integumentary tissues. Friction, stroking and percussion of the spine are among the most useful movements. They should be commenced very gently and be applied more vigorously as the tenderness disappears.

Convulsions of Children.—When fits arise from teething, or any other cause, the feet should be immediately bathed in warm lye water, and an anodyne administered, such as syrup of poppy, or paregoric. Garlic should be bruised and applied to the stomach, and if there is heat in the head, it may be bathed with spirits, cold water, or vinegar. Repeat these remedies as often as the fits occur; use warm baths in prolonged cases.

Corns, Warts, and Wens.—Binding half a cranberry, the cut side down, upon a corn, and renewing each night, will soon extract it.

Bread, soaked in vinegar, applied at night, bandaged with a piece of oil-cloth, will remove the corn after two or three applications.

One tea-spoonful of tar, one of coarse brown sugar, and one of salt-peter; the whole to be warmed together. Spread it on kid leather the size of the corns, and in two days they will be drawn out.

Take a lemon, cut a piece of it off, then nick it so as to let in the toe with the corn, the pulp next to the corn, tie this on at night so that it can not move, and you will find the next morning that, with a blunt knife, the corn can be taken away to a great extent. Two or three applications of this will effect a cure.

The strongest acetic acid, applied night and

morning with a camel's hair brush. In one week the corn will disappear—soft or hard corns.

Put one or two table-spoonsful of soda in a foot-tub of hot water, soak the feet half an hour, and repeat for two or three successive nights, when the alkali having dissolved the indurated cuticle, the corn falls out, and the cavity soon fills.

Pare the corns off with a sharp knife and bathe them with spirits of turpentine, and bind on a linen cloth saturated with the same, renewing it frequently, and in a few days the corn will come out.

The celebrated three minute salve for removing corns or warts: One pound caustic potassa, four drams belladonna, two ounces peroxide manganese, made into a salve.

For corns or warts, thicken the yolk of an egg with fine salt—if a little bruised rue leaves be added, the better; apply as a poultice for two or three successive nights, when the affected part becomes white, and will soon come out. Or, mix in half an ounce of alcohol, one dram each of nitric acid, muriatic acid, oil of rosemary, tincture of iron, and chloroform, and apply once a day.

If nitrate of silver, popularly called lunar caustic, be moistened and rubbed on a wart a few times, and a silk thread tied closely around the base of the wart, it will soon disappear. Five or six nightly applications of a poultice of scraped carrot and salt, or rubbing on sprigs of purslain, or saturating the warts some twenty times successively with spirits of turpentine, or dipping a clean pen in aquafortis and touching the warts daily a few times, or touching them gently with sulphuric acid, or a strong solution of sal-ammoniac in water, or with blue stone, will cause them to disappear.

Very strong salt and water, when frequently applied, has been known to cure wens.

Costiveness.—Every person ought to accustom himself to a regular time for evacuating the bowels. Total abstinence from eating, on failure of the action of the bowels at the proper time, is a good practice, drinking freely of cold water or hot teas, with free exercise in the open air. It is recommended to inflate the lungs fully, forcing the abdomen out as far as possible, hold the breath, and percuss the abdomen with the palms of the hands. Repeat from five to ten times. In their season, the eating of peaches early in the morning, or taking a table-spoonful of white unground mustard morning or night, or eating figs or berries, are all regarded as very beneficial. Swallowing a raw

egg every morning in a little sour wine, followed, if necessary, by a tumbler of cold water, an hour before breakfast, for several weeks, has often resulted favorably. A decoction of the flowers of the common alder is an excellent remedy.

A pill may be made for habitual costiveness, of ten grains of the extract of May apple, or mandrake, and three grains of calomel, to be taken in the morning, awhile before breakfast.

A conserve of hollyhock is a mild stimulant and tonic, and useful in cases of feeble digestion.

Cramps.—When a person is attacked with *cramp*, get some hot water, quietly and expeditiously (for noise and exclamations of grief and alarm still further disturb the nervous equilibrium) put the sufferer in the water as completely as possible, and thus heat is imparted to the blood, which sends it coursing along the veins, and the pain is gone. While the water is in preparation, rub the cramped part very briskly with the hand or a woolen flannel.

Or, a cold application to the bottom of the bare feet, such as iron, water, rock, earth, or ice, when it can be had—the colder the better. It will relieve in five minutes. If in the upper part of the body, or arms, then apply the remedy to the hands also.

Croup.—Croup is an inflammation of the inner surface of the windpipe. Apply iced-water with linen cloths, or almost hot water with woolen flannel, or two folds large enough to cover the whole throat and upper part of the chest. Put these in a pail of water as hot as the hand can bear, and keep it thus hot by adding water from a boiling tea-kettle at hand. Let a couple of flannels be in hot water all the time, and one on the throat all the time, with a dry flannel covering the wet one, so as to keep the heat in to some extent; the flannels should not be so wet when put on as to drip, for it is important to keep the clothing as dry as possible; and keep up the process until the phlegm is loose, the child easier, and beginning to fall asleep; then gently wrap a dry flannel over the wet one which is on, so as to cover it up entirely, and the child is saved. When it wakes up the flannels will be dry.

Equal parts of camphor, spirits of wine, and hartshorn well mixed and rubbed upon the throat, bathing the feet in hot water, is an excellent treatment for the croup. A tea-spoonful of sulphur, in a glass of water, using a tea-spoonful of this mixture every hour, has cured the croup in two days.

Croup in its first stages can be immediately broken up by repeated applications of poultices of bruised raw onions to the throat and chest. A piece of fresh lard, as large as a butternut, rubbed up with sugar, in the same way that butter and sugar are prepared for the dressing of puddings, divided in three parts, given at intervals of twenty minutes, will relieve any one of croup not already allowed to progress to the fatal point.

Or, bathe the neck with bear's or goose grease, or almost any kind of oil, and pour some down the throat. A linen rag soaked in sweet oil, butter, or lard, and sprinkled with yellow Scotch snuff, is said to have performed wonderful cures in cases of croup. It should be placed where the distress is the greatest.

The water-cure treatment is simple and beneficial. Put the patient into a tub of pump-water, and give as thorough a bath as may be, with considerable rubbing of the entire body, but particularly the breast. This must be repeated whenever the rule of temperature requires it, no two being generally nearer together than forty-five minutes. Once in every two or three hours the pack should take the place of the bath. Cold cloths should be applied to the head and breast, and a bottle of warm water to the feet, whenever it seems necessary.

Deafness.—Combine equal parts of musk, sulphuric ether, and aqua ammonia, and place cotton saturated with it in the ear, renewing it each night, and also dropping a few drops of it in the ear occasionally. A few drops of almond oil dropped in the ear at bed-time, thoroughly washed out next morning with soap and water, by means of a syringe, and repeated, softens impacted wax. Two drops of pure honey dropped into the ear a few times have removed the obstructions and restored the hearing.

General Debility.—A hot salt bath is a powerful tonic for persons of delicate constitutions, who find themselves at the foot of the ladder of health every Spring. If time can not be afforded for a bath, take a crash towel and wring it out of strong brine, let it dry, and when you get out of bed in the morning, rub yourself from top to toe, till the skin is all aglow. It will not take more than three minutes of your time, and you will feel the good of it all day.

Delirium Tremens.—Opium and brandy are remedies generally used—a three-grain pill, with a little brandy or other spirits; afterward giving a one-grain pill every hour for three or

four hours; or sixty drops of laudanum in the place of opium, for the first dose, and twenty to thirty drops for the subsequent ones. The extract of hyosciamus, a fine nerveine, milder than opium, may be combined with opium in pills of about two grains each, one pill at a dose, repeated every two or three hours till quiet is restored. Douching, sweating, water-drinking, and water-purging, will quickly bring the patient to his senses, and produce the desired sleep.

Diphtheria.—Dr. W. A. SCOTT, of Palmyra, Iowa, has contributed the following recipe for the cure of the diphtheria—in the use of which Dr. SCOTT asserts that not a single patient in a thousand cases has been lost: Thoroughly swab the back of the mouth and throat with a wash made thus: Table salt, two drams; black pepper, golden seal, nitrate of potash, alum, one dram each. Mix and pulverize; put into a tea-cup, which half fill with boiling water; stir well, and then fill up with good vinegar. Use every half hour, one, two, and four hours, as recovery progresses. The patient may swallow a little each time. Apply one ounce each of spirits of turpentine, sweet oil, and aqua ammonia, mixed, to the whole of the throat, and to the breast-bone every four hours, keeping flannel to the part.

The following remedy has been very successful where used: Make two small bags, that reach from ear to ear, and fill them with ashes and salt, dip them in hot water, and wring them out so they will not drip, and apply them to the throat; cover up the whole with a flannel cloth, and change them as often as they become cool, until the throat becomes irritated near blistering. For children it is necessary to put flannel cloths between the ashes and the throat to prevent blistering. When the ashes have been on a sufficient time, take a wet flannel cloth and rub it with castile soap until it is covered with a thick lather; dip it in hot water and apply it to the throat, and change as they cool; at the same time use a gargle made of one tea-spoonful of cayenne pepper, one of salt, one of molasses, in a tea-cupful of hot water, and when cool add one-fourth as much cider vinegar, and gargle every fifteen minutes until the patient requires sleep. A gargle made of castile soap is good to be used part of the time.

A poultice may be made of the yolk of an egg and fine salt, of paste-like consistency, put on the throat, and kept on thirty minutes, unless sooner dry, and repeated; and using a wash or gargle made of equal parts of fine salt

and alum mixed with vinegar; and, in very severe cases, a throat gargle of bloodroot, golden seal, and pulverized bayberry. This simple remedy is highly recommended. Holding a piece of gum-camphor the size of a pea in the mouth, or bits of ice, with a gargle of lemon juice, has proved highly successful.

Another remedy is inhaling the steam from a lump of lime about the size of the hand, while being slaked; the patients to sit on chairs over the lime, a sheet or blanket being thrown over them, to confine the steam as much as possible where the patients will have the full effect of it. The lime is taken into the windpipe, and the membrane which is being formed there is destroyed by it, and is forced out of the windpipe. This remedy has been tested in a large number of instances, and has worked wonders.

Or, make a strong solution of the sulphate of lime, with a plentiful addition of honey, and use as a gargle several times; or dissolve two drams of sal-ammonia in a pint of water, sweeten well also with honey, and gargle the throat three or four times a day with it. These gargles may be employed alternately. The external applications to the throat may be volatile liniment. But when the neck is very hot, it should be kept as cool as possible, even when making these topical applications.

The water-cure remedy is to reduce the fever by a wet-sheet pack; apply wet cloths to the throat, constantly keeping pieces of ice in the mouth. The next day take sitz baths, and a sponge bath, move the bowels gently, practising rigid abstemiousness.

For Dropsy.—Take two pills every second or third night before retiring to rest, made of two parts calomel, and one of squills, with or without a small quantity of camphor. Make a composition of four ounces Seneca snakeroot, horseradish, four ounces, and quassia half an ounce; put it into a gallon of water, and reduce by slow fire to a pint, to which add a pint of good whisky. Take a large table-spoonful of this composition every morning; but on the mornings after taking the pills the composition should not be taken until the pills have operated, or are about to do so. Take a common dose of salts in solution very early the next morning after taking the pills; do not breakfast until the medicine has operated. A tea-spoonful of the composition on lying down will improve the breathing, and, therefore, may be taken at any time. Emetics should be taken occasionally.

Other dropsy remedies: Burn corncobs to a

coal, and put them in water, with a little vinegar to make it more palatable, and use it as a constant drink as long as necessary.

Take the root of the dwarf elder in a decoction; it is an excellent diuretic, and more pleasant to the taste, and more agreeable to the stomach, than most other medicines of the same class. A decoction of milkweed is recommended for the same purpose.

Take six or eight pods of cowhage, rub off the fuzz, and put them into three pints of gin or whisky; after standing a day or two, take a wine-glass before breakfast every morning.

To Rescue Drowning Persons.—A recent treatise on the art of swimming gives these directions: If you have any distance to swim to reach the drowning person, the wisest plan is to undress, which can be done in a few seconds. You have then more freedom of limb, and can rush through the water with speed and alacrity. And, if the drowning person should succeed in clutching you, your chances of freeing yourself, being naked, are innumerable, compared with what they would have been hampered with your wet clothing. When you approach the drowning, watch diligently for an opportunity, and seize him by the back of the arm below the shoulder. You will, in this position, be enabled to keep him at arm's length before you, and exercise the most perfect control over his and your own movements. His face being from you, the temptation to grapple with you is removed, and you have more facility to make to the shore or most convenient place of landing. Never attempt to seize a drowning person by the hair of the head. There is great danger to be apprehended in so doing, for, as the arms are at liberty, you are liable to be caught in a death-grip at any moment.

Men are drowned by raising their arms above water, the unbuoyed weight of which depresses the head. Other animals have neither notion nor ability to act in a similar manner, and therefore swim naturally. When a man falls into deep water he will rise to the surface, and will continue there if he does not elevate his hands. If he moves his hands under the water in any way he pleases, his head will rise so high as to allow him free liberty to breathe; and, if he will use his legs as in the act of walking (or rather of walking up stairs), his shoulders will rise above the water, so that he may use the less exertion with his hands, or apply them to other purposes. These plain directions are recommended to the recollection of those who have not learned to swim

in their youth, as they may be found highly advantageous in preserving life.

To Bring the Drowned to Life.—The Humane Society of Massachusetts has given the following directions for the resuscitation of drowned persons:

I. Send, with speed, for medical aid, for articles of clothing, blankets, etc.

II. Treat the patient on the spot, in the open air, exposing the face and chest freely to the breeze, except in too cold weather.

III. Place the patient gently on the face (to allow any fluids to flow from the mouth).

IV. Then raise the patient to a sitting posture, and endeavor to excite respiration—

1. By snuff, hartshorn, etc., applied to the nostrils;

2. By irritating the throat by a feather, or the finger;

3. By dashing hot and cold water, alternately, on the face and chest. If there be no success, lose no time, but

V. Replace the patient on his face, his arms under his head, that the tongue may fall forward, and leave the entrance into the windpipe free, and that any fluids may flow out of the mouth; then

1. Turn the body, gradually but completely, on the side, and a little more, then again on the face, alternately (to induce inspiration and respiration).

2. When replaced apply pressure along the back and ribs, and then remove it (to induce further respiration and inspiration), and then proceed as before.

3. Let these measures be repeated gently, deliberately, sixteen times a minute only. Continuing these measures, rub all the limbs and the trunk upward, with warm hands, making firm pressure energetically. Replace the wet clothes by such other covering, etc., as can be procured.

The distinguished Dr. VALENTINE MOTT has given these directions: Immediately after the body is removed from the water, press the chest suddenly and forcibly downward and backward, and instantly discontinue the pressure. Repeat this violent interruption until a pair of common bellows can be procured. When obtained, introduce the muzzle well upon the base of the tongue. Surround the mouth with a towel or handkerchief, and close it. Direct a bystander to press firmly upon the projecting part of the neck (called Adam's apple), and use the bellows actively. Then press upon the chest to expel the air from the lungs,

to imitate natural breathing. Continue this at least an hour, unless signs of natural breathing come on. Wrap the body in blankets, place it near a fire, and do everything to preserve the natural warmth as well as to impart artificial heat if possible. Everything, however, is secondary to inflating the lungs. Avoid all frictions until respiration shall be in some degree restored.

Cautions.—1. Never rub the body with salt or spirits. 2. Never roll the body on casks. 3. Continue the remedies for twelve hours without ceasing.

Cure of Drunkenness.—The famous prescription by which thousands in England have been assisted in emancipating themselves from the slavery of appetite and degradation of drunkenness is as follows: Sulphate of iron, five grains; magnesia, ten grains; peppermint water, eleven drams; spirit of nutmeg, one dram—twice a day. This preparation acts as a tonic and stimulant, and so partially supplies the place of the accustomed liquor, and prevents that absolute physical and moral prostration that follows a sudden breaking off from the use of stimulating drinks.

Dumbness Cured.—During our recent civil war, a soldier, under the excitement of a great battle, lost his speech. His case baffled the skill of the experts of the army; but subsequently, imbibing freely of liquor, his power of utterance returned to him. Profiting by this example, Miss PARNELIA BARNELL, of Jacksonborough, Indiana, who, at the age of fifteen, had been taken with a trance, from which, after about eleven days, she was restored, but with the total loss of her speech, was induced to try the liquor treatment. Thus, after having been dumb for twenty-five years, she drank old rye whisky until completely inebriated. After lying in a catatonic state for two hours, she began to sober off, and, to the utter astonishment of all present, she began to talk, at first slowly, but afterward with as much ease as if the gift had never departed. The facts in this interesting case were communicated to the *Cincinnati Gazette*, in 1865, by S. H. HOSKOUR, of Cambridge City, Indiana.

Dysentery, Cholera Morbus, and Bowel Complaints.—The terrible cholera is nothing more than aggravated diarrhea or dysentery. It is important that all bowel complaints, especially in the Summer season, should be checked, yet not too suddenly. An indispensable step is absolute quietude on a bed; nature herself always prompts this by disinclining us to loco-

motion. The next thing is, to eat nothing but common rice, parched like coffee, and then boiled, and taken with a little salt and butter. Drink little or no liquid of any kind. Every step taken in diarrhea, every spoonful of liquid, only aggravates the disease. If locomotion is compulsory, the misfortune of the necessity may be lessened by having a stout piece of woolen flannel bound tightly round the abdomen, so as to be doubled in front and kept well in its place.

Dr. PAIGE, of Washington, states, that the following simple remedy, long known in family practice, was tested on a large scale during our recent civil war, in which, in a single regiment, having from eighty to one hundred cases daily of dysentery, rapid cures occurred in every case; and he adds, "in many hundred trials I have never known it to fail in dysentery and protracted diarrhea."

In a tea-cup half full of vinegar dissolve an much salt as it will take up, leaving a little excess of salt at the bottom of the cup. Pour boiling water upon the solution till the cup is two-thirds or three-quarters full. A scum will rise to the surface, which must be removed, and the solution allowed to cool. A table-spoonful three times a day till relieved, is a dose.

Another very successful army remedy was the following: Pulverized rhubarb, one dram; bicarbonate of soda, one dram; essence of peppermint, two drams; tincture of camphor, one dram; sulphate of morphia, ten grains; white sugar, four ounces; boiling water, one pint.

Put the first six articles in a bottle; then pour in gradually the boiling water.

Dose—a tea-spoonful; to be taken once every three to six hours, according to the circumstances.

Blackberry syrup is an excellent article for bowel difficulties, made as follows: To two quarts of blackberry juice, add half an ounce each of nutmeg, cinnamon, and allspice, and quarter of an ounce of powdered cloves, and boil them together for a short time. Add a pint of fourth proof brandy while hot, and sweeten with one pound of loaf sugar. This is an excellent remedy for Summer complaint; for a dose, from a tea-spoonful to a wine-glassful, according to the age of the patient, three times a day. Or, take a handful each of the leaves, the bark and root of blackberry, and boil them in a quart of water, simmered down to a pint; then add half an ounce each of nutmeg and cinnamon, and quarter of an ounce of cloves; after the strength is well extracted,

strain, and add a pound of sugar, and half a pint of good brandy. To a child two or three years old, give a tea-spoonful at a time as often as the bowels move; and two or three times as much to an adult.

An excellent diarrhea cordial: Take three ounces blackberry root, one ounce golden seal, one ounce gum myrrh, one ounce bayberry, one ounce evan root, one ounce sumach (leaves and berries), one ounce valerian, one ounce capsicum, one ounce allspice, one ounce ginger root. Put all, in a crude state, together, and steep in six quarts of water till evaporated to two after it is strained; then add two quarts of good brandy, two ounces extract of dandelion, from three to four ounces of pulverized cloves, and six or eight ounces of loaf sugar. Dose—for an adult, from one to two table-spoonful, in a little warm water, as often as the severity of the case may require.

The worst cases of cholera morbus, dysentery, and bloody flux can usually be readily cured by a strong tea from a handful of the bark of the sweet gum, fresh from the tree is best, steeped in a pint of water till dark and strong. Drink it clear or sweetened; or, if the case is a severe one, add good brandy.

An Indian remedy is a tea-spoonful of the powdered root of crane's-bill, in a decoction of water or milk, taken three or four times a day.

Put two handfuls of blackberry root in three pints of milk or water, and boil it down to a quart, and take a tea-cupful every two or three hours.

Take one pint new milk, an ounce of mutton-tallow, and one gill good brandy or blackberry wine—put all together in a vessel, and make scalding hot. Take about one-half as hot as can be drank. The balance in about two hours after if needed.

Take new-churned butter, before it is washed or salted; clarify over the fire, and skim off all the milky particles; add one-fourth brandy to preserve it, and loaf sugar to sweeten it. Let the patient (if an adult) take two table-spoonful twice a day.

An equal part each of laudanum, tincture of rhubarb, essence of peppermint, and spirits of camphor (mix). Dose for a child six months old, two drops; dose for a child twelve months old, four drops; dose for a child two years old, eight drops; for an adult, twenty drops, after each evacuation, to be given in sweetened water.

Three or four strawberry leaves eaten green is regarded as a good remedy; and a tea made

from them is a simple and reliable curative for children as well as for adults.

Put half an ounce each of pulverized gum kino and tincture of opium, into a pint of blackberry wine, and let it stand a week, with frequent shaking. Dose for an adult, a dessert spoonful two or three times a day.

Mix equal quantities of Thomsonian hot drops, or No. 6, and paregoric; take a tea-spoonful frequently till the complaint is checked.

Bloody Flux.—A very severe case of malignant bloody flux, reported to the *Water-Cure Journal*, was thus successfully treated, after the patient, a well-educated physician, had been given up by the doctors: "My treatment was, first, a wet-sheet pack for a half hour; then washed, wiped dry, and clean linen; a wet bandage about his abdomen, to be changed every two hours and covered with flannel. His bowels were now quiet for five hours. After this, small quantities of bilious matter were discharged every few hours. An injection of cold water after every discharge of the bowels was administered. Cold water in small quantities given as a drink. Sitting-bath morning and evening for fifteen or twenty minutes. On the third day his abdomen was covered with pimples, discharging water and pus. His skin had recovered its elasticity and softness. A critical fever followed. Pouring head-bath and tepid whole-baths were given every other day after the bandages were omitted, which was at the end of a week. In a few weeks he was as well as ever."

Dyspepsia.—The philosophy of dyspepsia is thus stated by a recent medical writer: As soon as food reaches the stomach of a hungry healthy man, it pours out a fluid substance called gastric juice, as instantly as the eye yields water if it be touched with anything hard; this gastric juice dissolves the food from without inward, as lumps of ice in a glass of water are melted from without inward. If from any cause the food is not thus melted, or dissolved, that is indigestion or dyspepsia. Vinegar, in its action on food, is more nearly like the gastric juice than any other fluid known. Thus it is that a pickle, or a little vinegar will settle the stomach, when some discomfort is experienced after eating.

In dyspeptic and nervous affections, due attention to quantity and quality is of vast importance in view of a speedy cure. Rule—In these cases, oat-meal gruel, or Indian-meal gruel, or arrowroot, or broths, are very good diet. They should never be taken hot, but

warm; a little above the temperature of new milk is best. These, with toast and water, and boiled mutton, or usual diet in great moderation, will assist the curative effects of the medicine. When oppression is experienced after meal, *reduce the quantity the next one, and keep reducing until no unpleasant effects are felt.* Then gradually increase if necessary. *But, as a rule, always leave off eating while you could eat more.* This is the way to bring the digestive organs right, using judiciously-chosen medicines.

A very simple remedy, much in vogue in France and England, is in taking no other nourishment than yolks of eggs, beaten up with the flour of potatoes, and water. Sir JOHN SINCLAIR'S mode of preparing it was this: Beat up an egg in a bowl, and then add six table-spoonsful of cold water, mix the whole well together; then add two table-spoonsful of the farina of potatoes, to be mixed thoroughly with the liquor in the bowl. Then pour in as much boiling water as will convert the whole into jelly, and mix it well. It may be taken either alone, or with the addition of a little milk and sugar, not only for breakfast, but in cases of great stomachic debility, or in consumptive disorders, at the other meals. The dish is light, easily digested, extremely wholesome and nourishing. Bread or biscuit may be taken with it, as the stomach grows stronger.

The following was employed by the eminent Dr. PRYSE in his own case, and as we are informed, was of decided advantage when all other remedies failed: Take of hickory ashes, one quart; soot, six ounces; boiling water, one gallon; mix and stir frequently; at the end of twenty-four hours, pour off the clear liquor. A tea-cupful may be taken three times a day.

Another remedy is: Take one pound of the extract of swine or sow thistle, two ounces each of magnesia and pulverized rhubarb, made into a common-sized pill; take one in the morning and two at night, with an external application of the extract of tobacco with tea leaves in a bandage over the stomach.

Boil up yellow dock root quite strong, and drink about a wine-glass before each meal.

Anti-Dyspeptic Pills.—Take half an ounce of gum ammoniac, jammed up, and put into a spider, or low iron vessel; keep it over a moderate fire until melted, frequently mashing up the gum with a knife to facilitate the melting, being careful not to burn it. Put in from twelve to fifteen tea-spoonsful of good molasses, stirred up and well incorporated, setting the

dish off the fire when the molasses is put in, to prevent its burning, yet maintaining sufficient heat to cook it well together; then add half an ounce of pulverized aloes, previously prepared and ready for use, melted and mixed with the other. Now take it from the fire, and when it becomes half cooled add an ounce of pulverized rhubarb, to be worked into the mixture with a knife at first, and then with the hands as soon as the mass is cool enough to admit of it, and let all be thoroughly worked together. Make into common four-grain pills. This, to our certain knowledge, is an invaluable remedy, and especially for enfeebled female dyspeptics.

Commence with four pills, or enough to operate well, and then take just enough each night to move the bowels gently—generally about two pills for an adult male, and one, and sometimes even less for females; this to be regularly continued until the dyspepsia is cured. For dyspepsia, this treatment has probably never been excelled; it has been so thoroughly tested, that we can not too highly commend its virtues.

A good quantity of old cheese is recommended as the best thing to eat when distressed by eating too much fruit, or oppressed with any kind of food. Physicians have given it in cases of most extreme danger.

Nervous Dyspepsia.—The water-cure treatment is, to take a morning ablution, a hip bath at eighty degrees, for ten minutes daily, a hot and cold foot bath at bed-time, and wear a wet girdle a part of each day. The diet should be mostly dry, solid, and abstemious in quantity. Do not drink at meals.

Infant Dyspeptics.—Boiled rice, boiled wheat meal, with good milk or a very little sugar, a moderate proportion of good mealy potatoes, and baked sweet apples, make a combination of the best articles for a dyspeptic infant liable to diarrhea.

Earache Remedies.—Take a small piece of cotton batting or cotton wool, making a depression in the centre with the end of a finger, and fill it with as much ground pepper as will rest on a five cent piece, gather it into a ball and tie it up, dip the ball into sweet oil and insert it into the ear, covering the latter with cotton wool, and use a bandage or cap to retain it in its place. Almost instant relief will be experienced, and the application is so gentle that an infant will not be injured by it, but experience relief as well as adults.

Cotton or wool wet with sweet oil and paregoric, or saturated with a strong decoction of

tobacco and placed in the ear; or vinegar poured on a hot brick, conducting the steam into the ear with a funnel, usually affords quick relief.

Put into the ear a small clove of garlic, steeped for a few minutes in warm salad oil, and rolled in muslin or thin linen. In some time the garlic is reduced to a pulp; and, having accomplished its object, should be replaced with cotton to prevent the patient taking cold.

An Emetic.—Six grains of tartar emetic and sixteen grains of ipecac.

Erysipelas.—At the first appearance of erysipelas or such eruptions, apply laudanum and lard beat up together.

Take a quantity of sassafras bark from the root; boil it well; add weak lye; drain off the liquid, and thicken it with wheat bran (or shorts if bran can not be had), making a poultice of it and apply to the part or parts affected, renewing it as often as it becomes dry. While using it, in the water that the patient may desire to drink, add a piece of saltpeter the size of a pea to a pint of water.

The water-cure treatment is: To keep down the general fever; local application of wet cloths; keeping the head cool by pouring cold water upon it, as much and as often, as necessary. Keep the feet warm. Bathe the patient as often during the night as may be necessary to give him sleep. Water drinking, clysters, and spare diet when the appetite comes, must be practised.

Eye-Sight.—MILTON's blindness was the result of overwork and dyspepsia. One of the most eminent American divines has, for some time, been compelled to forego the pleasure of reading, has spent thousands of dollars in vain, and lost years of time, in consequence of getting up several hours before day, and studying by artificial light. Multitudes of men and women have made their eyes weak for life by the too free use of the eye-sight in reading small print, and doing fine sewing.

In view of these things, it is well to observe the following rules in the use of the eyes:

Avoid all sudden changes between light and darkness.

Never begin to read, or write, or sew, for several minutes after coming from darkness to a bright light.

Never sit to sew or write by candle or lamp light at a table with a dark cloth on it. When no other remedy presents itself, spread a sheet, or white paper, before you.

Never read by twilight, or moonlight, or on a cloudy day.

Never read or sew directly in front of the light, or window, or door.

It is better to have the light fall from above, obliquely over the left shoulder.

Never sleep so that on first awaking, the eyes shall open on the light of a window.

Do not use the eye-sight so long that it requires an effort to discriminate.

Too much light creates a glare, and pains and confuses the sight. The moment you are sensible of an effort to distinguish, that moment cease, and take a walk or ride.

As the sky is blue and the earth green, it would seem that the ceiling should be of a bluish tinge, and the walls of some mellow tint.

The moment you are instinctively prompted to rub the eyes, that moment cease using them.

If the eyelids are glued together on waking up, do not forcibly open them, but apply the saliva with the finger; it is the speediest diluent in the world; then wash eyes and face in warm water.

Remedies for Sore Eyes.—One ounce sulphate of iron, or copperas; half an ounce sulphate of zinc, or white vitriol, in a pint of soft water; and filter the whole through several thicknesses of cloth, in order to free it from the coloring matter of the copperas.

Put eight grains of lunar caustic, made fine, into four ounces rain water, adding one ounce of laudanum well shaken, when it is fit for use.

Steep thoroughly a quarter of an ounce of goldthread, till the liquor is reduced to about a gill; then add finely-pulverized alum about the size of a kernel of corn; then filter or strain.

Dissolve a tea-spoonful of honey in a wine-glass of water, if this be too strong so as to cause the eyes to smart very much, reduce with water—it will perfectly cleanse and heal, and will in some measure restore the sight of aged persons if used for a few weeks, two or three times a day.

Take of sulphate of zinc ten grains, sugar of lead twenty grains, rose water one pint; dissolve each separately and mix. Turn off the clear liquor for use.

Steep one-fourth of an ounce of flowers of arnica in a quart of water, till reduced to a gill. Mix a tea-spoonful of this arnica water with the same quantity of rain water, when it is fit for use.

To one gill of soft water add forty-five grains each of fine salt and fine loaf sugar, and twenty-

three grains each of sugar of lead and white vitriol made fine.

Make a decoction of fresh wild turnip or of lobelia, strain through a fine cloth; or dissolve twelve grains of white vitriol, and sixteen of sugar of lead, in half a pint of soft water or whey, and put the mixture in three gills of new milk, and use for eye-water.

Wash the eyes in cold spring water after small split sticks of sassafras have been previously soaked in it; it is both cooling and healing.

The water-cure remedy for inflamed eyes, is to persevere in a strict vegetable diet; wash the eyes in tepid water two or three times a day; take a sponge-bath daily, and one or two short hip and foot baths,

For *sore eyelids*, use the ointment of nitrate of silver, putting a few drops of laudanum into the eye immediately afterward, and repeat.

Removal of Particles from the Eye.—When a foreign body, such as a particle of straw, dust, etc., gets between the eyelids and the globe of the eye, but without being inflected, a solution of gum arabic, dropped into the eye, may be advantageously employed for its extraction, as the solution does not produce any disagreeable sensation.

Or, take a horse hair and double it, leaving a loop. If the mote can be seen, lay the loop over it, close the eye, and the mote will come out as the hair is withdrawn. If the irritating object can not be seen, raise the lid of the eye as far as possible, and place the loop in it as far as you can, close the eye and roll the ball around a few times, then draw out the hair; the substance which caused so much pain will be sure to come with it.

A particle of iron or steel, if not too deeply imbedded, may be removed by the application of a powerful magnet.

A strong solution of sugar, inserted drop by drop, under the eyelids, will completely prevent the caustic action of lime, if applied immediately.

Falling of the Womb.—In such cases, the horizontal posture in bed, with the hips elevated, is exceedingly desirable; with fomentations or warm bathing applied to the lower bowels and womb, taking twenty to thirty drops of laudanum to check the pain. Frequent bathing the affected parts with cold water, or cold water womb injections with a syringe, with the use of abdominal supporters; alternating these cold water injections with an oak-bark decoction to be used cold, with a little alum

dissolved in it, are all usually beneficial in moderate cases, in connection with properly regulated diet. Sitz baths, and warm and cold local baths, are useful in such cases. In severe cases, a skillful physician should be called.

Fainting.—If a person faints, place him flat on his back on the floor, loosen his clothing, and push the crowd away so as to allow the air to reach him, and let him alone. It is barbarous to dash water over a person in a fainting fit.

Felons.—Stir air-slaked lime into a pint of soft soap until it reaches the consistency of soft putty; make a leather thimble, fill it with this composition, insert the finger, and the cure is certain. Or, wrap the part affected with a cloth thoroughly saturated with tincture of lobelia. Or, cut a hole in a lemon and thrust in the finger, encasing the felon in the acid fruit. Or, use a salve made of equal parts of salt, hard soap, and spirits of turpentine, renewing it. Or, soak a piece of rennet in warm milk until it becomes soft, apply it to the felon, and renew it occasionally; or apply bruised bitter-sweet berries in the same manner. If a felon or ringworm appears to be coming on the finger, soak the finger thoroughly in hot lye, even though it be painful.

For Female Weakness.—Take a handful of hollyhock blossoms, three pints port wine, a quarter of a pound of loaf sugar, and a grated nutmeg. Take a wine-glass every morning before breakfast.

Feet.—To *Allay Pains in the*—For such pains, caused by fatigue, bathe them in warm water and salt, and rub them well with a coarse towel. This has also cured neuralgia and rheumatism.

Nail in the Foot.—To relieve from the terrible effects of running a nail in the foot of man or horse, take peach leaves, bruise them, apply to the wound, confine with bandage, and the cure is as if by magic. Renew the application twice a day if necessary, but one application usually does the work. Binding a piece of fat salt pork on the wound is a very common remedy.

Fevers.—When persons are feverish and thirsty beyond what is natural, indicated, in some cases, by a metallic taste in the mouth, especially after drinking water, or by a whitish appearance of the greater part of the surface of the tongue, one of the best "coolers," internal or external, is to take a lemon, cut off the top, sprinkling over it some loaf sugar, working it downward into the lemon with a spoon, and then suck it slowly, squeezing the lemon,

and adding more sugar as the acidity increases from being brought up from a lower point. Invalids with feverishness may take two or three lemons a day, in this manner, with the most marked benefit, manifested by a sense of coolness, comfort and invigoration.

In an early stage of fever use saltpeter, in doses from five to fifteen grains, every two hours.

Ague and Fever.—A celebrated doctor says that a third or half a wine-glass of lime or lemon juice, in which is dissolved a piece of chalk about the size of a small hickory-nut, will effectually cure chills. To be taken while effervescing, and on the first symptoms of the chill.

For ague and fever, and other intermittent fevers, take three-quarters of an ounce of finely-ground coffee with two ounces of lemon or lime juice, and three ounces of water; this mixture to be drank warm, and while fasting.

Pure apple vinegar, about a wine-glassful at a time, at intervals before the return of the chills, has broken and cured ague and fever.

Take best Peruvian bark, two ounces; wild cherry-tree bark, two ounces; poplar, one ounce; ginger, one table-spoonful; cinnamon, one dram; balmoney, one ounce; capsicum, one table-spoonful; cloves, quarter ounce. Have all finely pulverized, and put in two quarts good port wine, and let it stand one or two days before using. Take a wine-glassful four or five times a day, and the disease will soon disappear. Much better and safer than quinine.

Take of the best brandy one pint, camphor one ounce, dissolved; cloves and jalap each half an ounce, Peruvian bark two ounces, Virginia snakeroot one ounce, water one pint; boil the cloves and root with the water, to one-half; strain and mix the others in powder with the above. Dose—a table-spoonful three times a day in the absence of the fever.

Blackberry wine with Peruvian bark and quinine is regarded as a sure and safe remedy for fever and ague.

Boil down a pailful of boneset or thoroughwort to two quarts of strong liquor, when done, strain, and add one quart of molasses, and boil again a few minutes; then put it in a bottle or jug, adding a pint of good brandy, and one ounce each of rhubarb and Peruvian bark. Take a table-spoonful three times a day, or as much as the patient can bear. A sure remedy if persevered in. Some use it without the brandy, rhubarb, and Peruvian bark; the latter is good to compound with the boneset, and with-

out the liquor, the decoction will need to be frequently renewed.

A decoction of sweet flag, dogwood blows or bark, cherry bark, hops, etc., may be used as a preventive of the ague in low, marshy regions.

Put three hen's eggs into a pint of good vinegar; after the shell is dissolved remove the eggs, and take half a gill of this vinegar at a time three times a day.

Mix equal parts of pulverized cinnamon, rhubarb, sulphur, and cream of tartar; a tea-spoonful of this mixture in molasses should be taken three times a day; and if the ague still continues obstinate, make a syrup of snake-root, ginseng, wormwood, coltsfoot, cohosh-root, tansy, and hyssop, adding spirits and molasses, to be taken before the ague fit; and another syrup, made of coldwort or coldweed, chicken grass, bullrush, and maiden-hair, to be taken after the fit.

A strong tea of the bark of crab-apple tree is highly recommended, as a cure for the ague and fever.

Fever and Ague Physic.—One ounce each of gum aloes, rhubarb, cloves, and cinnamon, and two ounces of red Peruvian bark, all well pulverized, and put into a quart of whisky; take a table-spoonful one hour before each meal.

Rhubarb, columbo, and essence of peppermint, each one ounce, one pint of water, forty-five grains quinine. Table-spoonful once an hour until it operates as physic; then, same amount three times a day. To keep, add one gill of whisky.

Fever and Ague Pills.—Take blue mass twenty grains, sulphate quinine thirty grains, oil of black pepper twelve grains; make into twelve pills, and take one every hour for six hours before the chill.

Take of aloes two ounces, gamboge and cream of tartar each one ounce, sal-niter (saltpeter) half an ounce. Divide into pills of five grains each, of which three are a dose. Powder and sift the whole, and mix in a mass with syrup or molasses.

Water-Cure Treatment.—First, give the patient a warm rubbing bath, to get the skin in good working order, with a dash of the douche after it, and put him on a fever diet of dry brown toast and berries. The next day, as the symptoms begin to appear, put him in the wet-sheet pack—and in the midst of the fever and perspiration which follow the chills, put him under the douche; the next day a douche, and the third a pack—helping the sweating with the blanket pack, toning and stimulating with

the douche. A week or two's treatment will conquer.

Congestive Fever, or Cold Plague.—This is a malignant form of congestive fever, commencing with a chill, and running its course in a very short time, if not arrested, assuming a typhus form, and often terminating fatally. It requires energetic treatment. Copious blood-letting, strong hot brandy toddy, plasters to the stomach and feet and hands, have been successfully tried. Salts as a cathartic and followed by quinine, have been useful.

Hay Fever.—N. S. LEEDS, of Richmond, Indiana, communicated, in September, 1868, to the *Cincinnati Commercial*, his experience relative to the hay fever in the nose, says: In years past I have been treated by allopathic, homeopathic, and water-cure physicians, but all admitted their inability to cure. Dr. WM. T. DOUGAN, of Niles, Michigan, conceived the idea that the disease was local, developing itself first in the nose, and, if treated topically, it could be arrested, or at least confined to the nose. His diagnosis proved correct. He gave me the following prescription, which held my attack this year in check, or at least so controlled it that I was enabled to attend to business, as usual. I have been subject to attacks of "hay fever," periodically since 1853, commencing the 15th of August, and lasting about four weeks, and have found no relief until this season, save in "fleeing to the mountains." Knowing that thousands are afflicted as I am, and the medical fraternity helpless to relieve, I take great pleasure in giving my testimony to the entire efficiency of this treatment.

Prescription: Take one quart of warm rain water, add a table spoonful of salt; stir till dissolved, and, by means of a "nasal douche," pass it through the nostrils, to be followed immediately by another quart of warm water, to which add zinc sulphate, six grains; morphine, two-thirds of a grain; pure glycerine, three drams; carbolic acid, fifteen to twenty-five drops; stir well, and pass it through the nostril, as before. The first quart should be passed through the nose under a high pressure, to remove as much as possible all poisonous secretions from the linings of the nose; while the last should be done slowly, to allow the medicine to act on the mucous membrane. This can be regulated by elevating or lowering the reservoir of the douche. I repeat the operation from four to six times a day. The salt and water should be administered some two weeks prior to the time of attack, as it is of great

benefit in removing whatever the irritating cause may be. For sulphate of zinc can be substituted any astringent—tannin, sugar of lead, etc.—but morphine, glycerine, and carbolic acid are deemed indispensable.

Scarlet Fever.—Is so called from the color and appearance of the skin, and the scarlet eruptions that appear on the body; occurring at all seasons of the year, but generally in the Fall and beginning of Winter, children and young persons being most subject to it. When the fever runs high, and the throat is seriously affected, it assumes the character of a putrid sore throat, which is very dangerous, because mortification is apt to take place.

In ordinary cases of scarlet fever, or measles, use freely raw, unground barley, steeped into a tea.

Dr. LINDSLY, of Washington, strongly recommends the mode of treatment of scarlet fever resorted to by Dr. SCHNEEMANN, physician to the King of Hanover. It is as follows, and exceedingly simple: From the first day of the illness, and as soon as we are certain of its nature, the patient must be rubbed morning and evening over the whole body with a piece of bacon, in such a manner that, with the exception of the head, a covering of fat is everywhere applied. In order to make this rubbing-in somewhat easier, it is best to take a piece of bacon the size of the hand, choosing a part still armed with the rind, that we may have a firm grasp. On the soft side of this piece slits are to be made, in order to allow the oozing out of the fat. The rubbing must be thoroughly performed, and not too quickly, in order that the skin may be regularly saturated with the fat.

Responsible men from neighboring counties in Maryland testify to numerous instances of the fat-bacon treatment with uniform success, while those who depended on medicines alone, had, in most cases, fallen victims to the disease.

Dr. W. FIELDS, of Delaware, says the following treatment, if faithfully followed, will cure nine out of every ten cases: For adults, give one table-spoonful of good brewer's yeast in three table-spoonsful of sweetened water, three times a day; and if the throat is much swollen, gargle with yeast, and apply yeast to the throat as a poultice, mixed with Indian meal. Use a plenty of catnip tea, to keep the eruption out of the skin for several days.

Another mode of treatment is to wash the patient in weak lye which feels a little slippery to the fingers. It is best to begin in time, when the fever or redness first appears; and with a

cloth or sponge apply it all over the child every few hours; but if the fever has got up, it should be repeated every five minutes until the heat abates. Even bathing the feet in weak lye has a very soothing effect. Bleeding and strong cathartics are *bad*—nauseating doses of ipecac *good*. If the throat is swelled, apply sweet oil, or a liniment made of this and aqua ammonia, and drink freely of slippery elm, catnip, or sage tea. If the swelling is very bad, it is best to call in the doctor—or blister, and apply a bag of hops dipped in warm vinegar round the neck from ear to ear, the sufferer breathing the fumes of the vinegar. Gargling a strong infusion of seneca snakeroot or cayenne pepper will do for large children or grown persons; and afterward use vinegar of squills. Give a dose of calomel when the skin begins to peel off; and be very careful, for many days after, not to take cold.

Dr. CHARLES T. THOMPSON reports in the *Lancet*, that repeatedly immersing the patient as the strength will allow, in a warm bath, in the early stage of the disease, produces a soothing and refreshing feeling, soon followed by multitudes of eruptions on the surface—thus one of the greatest dangers of this malady—the suppression of the eruption—is avoided. The bath prevents the dissemination of the disease; the body should be gently dried by soft linen cloths after each bath. After a few baths, the appetite generally returns, when nutritious food should be provided. Dr. THOMPSON testifies, that in pursuing this simple treatment for fifteen years, he has not lost a single patient.

Spotted Fever.—Sometimes called malignant nervous fever, or sinking typhus, has prevailed at different periods in New England, and in some portions of the West in 1865. In most cases it is best to commence with an emetic; after which, move the bowels, bathe the feet thoroughly in mustard and water, and give freely an infusion of plcurisy root and boneset. Sponge frequently with vinegar and water, and as the fever begins to subside, give quinine in the usual doses. In severer cases, besides the emetic, put a mustard plaster the entire length of the spine, and flannel cloths wrung out of hot mustard water to the legs and bowels; and when the emetic has operated, give one grain doses of ipecac, with from two to ten grains of quinine—the greater the prostration the larger the dose of quinine.

Typhoid Fever.—After an emetic, aided by warm stimulating drinks, hot mustard foot baths, and warmth applied to the body by use of bottles of hot water, put twenty drops of the

tincture of aconite root in two thirds of a tumbler of water, and administer a tea-spoonful every hour. If the skin is hot, the alkaline sponge bath should be employed three or four times a day; and the extremities should be constantly kept warm. When secretion has commenced, but not before, quinine should be used to increase the strength.

Typhus or Nervous Fever.—Whether caused by impure air, damaged provisions, over-fatigue, excessive indulgence, or whatever weakens the nervous system, it is essentially a disease of debility. Give an emetic, and weak camomile tea, and the next day give some active purgative. Tonics, such as quinine, wines, cordials, should be early employed, with a nourishing diet, cleanliness, and pure air. Dry heat, and mustard plasters to the feet, are excellent aids in restoring the flagging energies of the system. Yeast, in this disease, is a valuable remedy—two or three table-spoonfuls, every two or three hours, have afforded immediate relief, and speedy recovery. This remedy given to fifty typhus patients, restored them all.

Yellow Fever and Black Vomit.—The following is regarded as an infallible remedy for these terrible diseases, having cured many persons after having been given up by medical men: Take the juice of the green leaves of the verbena, obtained by pounding them with a pestle and mortar, and give it to the patient in small doses, three times a day, accompanied by injections of the same juice every two hours, until the bowels are cleansed. Many of the medical profession have adopted this remedy. The verbena is a small shrub which grows in all countries, principally in low, moist situations—and there are two species, male and female, the latter being mostly used for this purpose. In a recent yellow fever epidemic in New Orleans, about five thousand of the frequenters of the haunts of intemperance were swept away before a single temperate, sober man was touched.

Fever Sores.—Wash and syringe the sore with a decoction of shrub maple, or white-oak bark; then make a strong decoction of blue-flag root and shrub maple, strain, and simmer down to a salve, adding beeswax and honey, well mixed before getting cold. Apply this as a plaster, and drink freely of tar water.

Flatulence or Wind.—To correct the stomach, or eject wind, mix together two ounces of simple syrup, with one ounce each of spirits of turpentine and mucilage of gum arabic; and take a tea-spoonful every two or three hours until the difficulty is removed.

Flatulence, or colic, may be temporarily relieved with fomentations; or chewing saffron leaves and swallowing the juice, is good for a windy stomach.

For flatulency, acidity, and gripes in young infants, mix an ounce each of pulverized rhu-barb and pulverized saleratus or sal-soda; then, to a large spoonful, add half a pint of boiling water; when cool, strain it, and add a little essence of peppermint and a table-spoonful of brandy, sweetening it with sugar. The mother or nurse should take one or two table-spoonful every hour, or oftener, according to the symptoms. If this does not remove the complaint, give some of the same to the infant. Catnip and soot teas are also very good for such complaints.

Frost Bites and Chilblains.—If frozen away from home the limb should be plunged deep into the snow. If near home, put the frozen part into water in which there is a considerable portion of ice in small bits, to keep the temperature of the water to the requisite degree of coldness—about 32°. The frozen part should not be rubbed, but the unfrozen flesh near it may be to good advantage, as that would hasten the recirculation of the blood.

After the frost is drawn from the limbs, permanent relief may be secured by one or two applications of boiled lye of wood ashes, made so strong as to be slippery between the fingers, settled, drained, and a large handful of salt mixed with each quart of the liquid. Or, apply kerosene oil, or oil of peppermint, to the frozen parts a few times at night, when retiring to bed; or, bathe the feet with a solution of one ounce of gum shellac and four ounces of alcohol.

A salve for frost bites, long known and highly valued in Germany: Twenty-four ounces of mutton tallow, twenty-four ounces of hog's lard, four ounces of peroxide of iron, four ounces of Venice turpentine, two ounces oil of bergamot, two ounces of bole Armenia, rubbed to a paste with olive oil. Melt together the tallow, lard, and peroxide of iron, stirring constantly until the mass assumes a perfectly black color; then add gradually the other ingredients, stirring until well mixed. Spread on linen, and apply daily. Its effect upon even the most painful frost sore is most extraordinary.

Chilblains are caused by sudden changes from excessive cold to too great heat. When the foot is exposed for a considerable length of time to a low temperature, the circulation of

blood is diminished, and the surface, if not the whole structure, chilled, benumbed, and stiffened. The feet, when chilled, should be brought to their normal state very slowly and gradually by exercise or rubbing, rather than by approach to the fire. But when swelling and redness are already present, gentle frictions with pulverized starch will give relief from the itching and smarting. So also will an ointment composed of two ounces of collodion, one ounce of Venice turpentine, and half an ounce of castor oil, well mixed. Spirits of turpentine afford relief to some, either alone or mixed with olive oil, or warm spirits of rosemary. So also will solutions of white vitriol, sal-ammonia, chloride of lime, sugar of lead, etc.; but no application yet tried has proved so generally useful as petroleum or coal oil (kerosene.) Rub the swellings with it, and also keep it constantly applied by wetting the stocking with it over the swollen toes or heel. Some prefer to mix it with hartshorn—one part of hartshorn to two parts of the oil. Equal parts of kerosene and lime water have also been found useful.

Gall Stones.—When the pain is severe, give an emetic or cathartic, which will be likely to remove the gall stone. If not, give twenty to thirty drops of laudanum, and repeat according to the urgency of the case. A warm bath will frequently give immediate and permanent relief. Soap, alkalies, nitric acid, and from thirty to eighty drops of the tincture of blood-root, and hemp-seed are sometimes used to dissolve the gall stone; but these remedies are not reliable. Mercury will relieve the pain, and generally effect a cure, if the disease is not dependent on an unhealthy liver.

Gravel.—The use of honey, eaten with the food, or used in tea, has frequently proved beneficial. Or, make a strong decoction of the roots of ox balm and the queen of the meadow, and drink it freely, and as warm as it can be borne. Or, use a decoction of the root called Jacob's ladder.

Headache.—The severest cases of headache are oftentimes helped, and the nervous headache cured, by some sympathizing person rubbing the hands from the top of the head down, and off the shoulders, after the mesmeric manner. The most intense pain can be soothed in a few minutes by this simple remedy, remembering to carry the hands upward farther away from the head than when the downward pass is made. This will frequently cure the toothache.

Dr. Socquet, of Paris, considers nitrate of silver an infallible specific for nervous head-

ache. His formula for a pill is: Take three centigrammes of nitrate of silver, and six centigrammes of sal-ammoniac, with a sufficient quantity of extract of gentian. Two or three of these pills may be taken in the course of twenty-four hours, viz.: in the morning, fasting, in the middle of the day, and before going to bed. Nervous headaches that had lasted for years have been thus cured in the course of three or four days. Three or four of these pills will remove the headache which accompanies the milk fever, and sometimes lasts as long as twenty days.

Bathe the forehead and temples with a mixture of equal parts of hartshorn and strong vinegar, and snuff a little of it up the nose. Or, bathe the head with this essence: Four ounces of liquor ammonia, half a dram of English oil of lavender, and one ounce of camphor dissolved in a pint of spirit of wine.

Drink half a dram of aromatic spirits of ammonia, in a little water, and at the same time apply a cloth to the forehead wet in a solution of one ounce each of muriate of ammonia and alcohol in nine ounces of water.

When sick headache is caused by superabundance of acid on the stomach, drink two tea-spoonful of finely-pulverized charcoal in half a tumbler of water, and it will generally give relief in fifteen minutes. When sick headache proceeds from a foul stomach, an emetic is the fitting remedy; when it proceeds from a bad state of the liver, the water-cure treatment is excellent—wet-sheet packing, and rubbing wet sheet, the half bath, and wet girdle; with coarse diet, Graham bread, apples, and parched corn.

Heart Disease.—The victims of this disease are generally persons of irregular or wandering habits, or addicted to strong drink. Give a tea-spoonful of a mixture of equal parts of laudanum and ether, in a little cold water, repeating it till relief is afforded. An issue made upon each thigh has frequently cured this complaint. A strong mustard plaster applied to the breast, and one between the shoulders, and also hot applications to the feet, are excellent remedies. Cultivate a quiet, even temper of mind—avoiding all sudden and violent exertions of strength; using a vegetable diet mainly, with cold water for drink, rising early, and exercising moderately, are the best conditions both of relief and of cure.

For *palpitation of the heart*, put into a quart of best whisky about one and a half tea-cups of prickly-ash berries; and take a tea-spoonful three times a day, awhile before each meal.

This is also excellent for the blood, and for a debilitated system.

Hip Injury.—Stiffness and weakness of muscles, consequent on blows, falls, etc., are often improved or cured by a persevering use of the douche—applying as strong a force to the affected parts as can be borne without discomfort.

Hunger.—For inordinate hunger, supposing it to proceed from a stomach acid, take a tea-spoonful each of magnesia and sugar in a table-spoonful of milk or beer.

Hydrophobia.—JOHN WESLEY's remedies for the bite of a rabid dog were:

1. Plunge into cold water daily for twenty days—keep under as long as possible. This has cured, even after the hydrophobia had begun.

2. Or mix the ashes of trefoil, or oak ashes, with hog's lard, and anoint the part bitten as soon as possible, repeat twice or thrice, at six hours' intermission. This has cured many in England, and, in one instance particularly, a dog bitten on the nose by a mad dog.

3. Or mix a pound of salt with a quart of water; squeeze, bathe, and wash the wound with this brine for one hour; then bind some fine salt on the wound for twelve hours. The author of this receipt was bitten six times by rabid or mad dogs, and each time cured himself by this simple remedy.

A writer in the *National Intelligencer* says that spirit of hartshorn is a certain remedy for the bite of a mad dog. The wounds, he adds, should be constantly bathed with it, and three or four doses, diluted, taken inwardly during the day. The hartshorn decomposes, chemically, the virus insinuated into the wound, and immediately alters and destroys its deleteriousness. The writer, who resided in Brazil for some time, first tried it for the bite of a scorpion, and found that it removed pain and inflammation almost instantly. Subsequently he tried it for the bite of a rattlesnake with similar success. At the suggestion of the writer, an old friend and physician in England tried it in cases of hydrophobia, and always with success.

Put an ounce and a half of sliced or bruised root of elecampane—the green root is preferable—into a pint of fresh milk, boil down to half a pint, strain, and, when cold, drink it, fasting at least six hours afterward. The next morning make a similar decoction from two ounces of the root, fasting as before; and repeat on the third morning. This is highly

recommended as a sure antidote of the bite of mad dogs, and has been repeatedly tried with uniform success. Five children bitten were thus cured, and eighteen years afterward exhibited no evidences of the virus or injury.

Mr. JOHN GRAY, of Covington, Kentucky, gives the following cure for hydrophobia, which, he says, he *knows* has proven effectual in at least fifty cases, and asserts that Dr. MEAD, an English physician, declares he never knew it to fail in a practice of thirty years, in which he had used it a thousand times: Take ash-colored ground liverwort, cleaned, dried, and powdered, half an ounce; of black pepper, powdered, half an ounce; mix these well together and divide the powder into four doses, one of which must be taken before breakfast for four successive mornings, in half a pint of warm cow's milk. After all these four doses are taken, the patient must go into a cold bath before eating every morning for a month. He must be dipped all over, but not stay in, with his head above water, longer than half a minute, if the water is very cold. After this, he must go in three times a week for a fortnight longer. It should be borne in mind that the "ash-colored ground liverwort" is the European liverwort, and is a very different thing from the American or Quaker liverwort, and it is difficult to obtain it of our druggists. They ought to become acquainted with its inestimable virtues, and provide a constant supply.

The douche is recommended—a jet of water of any required size and height can be made a most powerful agent in subduing the hydrophobia; after douching, perspiration is brought on by coverings to retain the heat.

A preventive of hydrophobia is, to take a white onion, cut it across the grain into four equal slices, sprinkle fine salt on them, and apply them to the wound, bandaged on, as soon as possible after the bite, when the onion will extract the poison; repeating every half hour with fresh slices until the onion ceases to show any discoloration. Then apply a healing plaster.

Another preventive, discovered by M. COSTER, a French physician, is a constant bathing of the wound with a mixture of two table-spoonsful of fresh chloride of lime in half a pint of water, which decomposes and neutralizes the virus.

Of the mad-stone remedy, which is noticed among the antidotes to poison, Dr. JOHN C. GUNN, in his excellent work, the *New Family*

Physician,* says: "I have always heard of its uniform success, and would recommend that whenever this celebrated stone or talisman can be found, it should be tried."

Hydrothorax.—This disease, known also as dropsy in the chest, with the lower extremities badly swollen, livid, and tumorous, should be treated as one of the topical kinds of dropsy. A tea-spoonful of spirits of turpentine, taken frequently, is often beneficial. Or a strong extract of dandelion root—the freshly dug root is preferable—with a little orange peel added; take two or three tea-cupsful a day. Frequent purgatives are important.

Inflammation and Swellings.—Pound or crush a fresh beet from the garden, and apply it as a poultice to an inflamed wound, and frequently renew it with a fresh one; this will secure a speedy cure. Or, boil leaves and stalks of poppies, and simmer down nearly all the liquid, and apply as a poultice, and frequently renew, to check inflammation or mortification. Or, get a strong decoction from blue-flag roots, and make a poultice of it by stirring in bran, and apply it to the inflamed part. Or, dissolve sugar of lead in water and vinegar, and saturate linen cloths with it, and place upon the inflamed, swelled, or erupted parts.

A kind of cushion of powered ice kept to the entire scalp has allayed violent inflammation of the brain, and arrested fearful convulsions induced by too much blood there. In croup, water, as cold as ice can make it, applied freely to the throat, neck, and chest, with a sponge or cloth, very often affords an almost miraculous relief; and, if this be followed by drinking copiously of the same ice-cold element, the wetted parts wiped dry, and the child be wrapped up well in the bed-clothes, it falls into a delightful and life-giving slumber. All inflammations, internal or external, are promptly subdued by the application of ice or ice-water, because it is converted into steam and rapidly conveys away the extra heat, and also diminishes the quantity of blood in the vessel of the part.

For a White Swelling.—Take swamp moss, that which grows on the ground is best, or that on old logs, if quite green will do; boil it in strong vinegar, and apply to the swelling as hot as can be borne, repeating once in three hours until it is reduced. Then to strengthen and complete the cure, make a strong decoction

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of the bark of white oak and sweet apple tree, and bathe frequently. The bark of the sweet apple is a powerful astringent.

Nothing can be better for an outward application in inflammation of the bowels than to take the yolks of six eggs, stir in salt sufficient to make a poultice. Spread it upon a piece of linen or cotton, and apply it to the bowels; it will be moist and consequently cool for twenty-four hours. The water-cure treatment directs copious tepid injections for the constipated state of the bowels, applying wet cloths freely to the whole abdomen—the colder the water, so as not to be disagreeable, the better. Small quantities of ice or iced-water, may be frequently taken; and drink any quantity required of water of a moderate temperature. When severe diarrhea occurs, the warm sitz bath and cold water injections may be occasionally employed to advantage.

In-Growing Nails.—Put a very small piece of tallow in a spoon, and heat it over a lamp until it becomes very hot, and drop two or three drops of it between the nail and granulations. The effect is almost magical. Pain and tenderness are at once relieved, and in a few days the granulations are all gone, the diseased parts dry and destitute of feeling, and the edge of the nail exposed, so as to admit of being pared without any inconvenience. The operation causes little or no pain, if the tallow is properly heated.

Test of Insanity.—"I can not," says Dr. WIGAN, "remember to have seen a single instance of insanity, however slight, and however incognizable by any but an experienced medical man, where the patient, after relating a short history of his complaints, physical, moral, and social, could, on trying to repeat the narrative, follow the same series. To repeat the same words, even with the limited correctness of a sane person, is, I believe, always impossible in the very mildest case of insanity." This test can not be relied on, however, in monomania, or any of the milder forms of insanity.

Itch.—It matters but little with the sufferer whether the itch proceeds from the presence of parasites beneath the scarf skin, or from an irritated or deranged liver—relief is what is wanted. To cure the itch in two hours, take of flour of sulphur three ounces, quicklime five ounces, water two pints; boil them together, and when they have perfectly combined, allow the liquid to cool, and decant them into hermetically-stopped bottles. Three and a half ounces is sufficient to effect a cure. The patient

is first well rubbed all over with soft soap for half an hour, and placed in a bath of tepid water for another half hour. He is then rubbed over with the solution of sulphuret of calcium, which is allowed to dry on the skin for a quarter of an hour. The operation is completed by washing in the bath.

Another recommends to wash twice a day with strong soft soap; it will usually cure; if not, after washing as above, apply an ointment every night composed of two ounces of lard, half an ounce of sulphur, and quarter of an ounce of salts of tartar, well mixed. Or, mix together two ounces each of lard and flour of sulphur, two drams each of white hellebore and sal-tartar, and twenty drops of oil of lemon. A single application of petroleum all over the body will generally cure. When the itch proceeds from a disordered liver, the diet should be rectified, using coarse, unbolted farinaceous food, with fruits and vegetables, abjuring pork, grease, and hard water, using but little salt.

A handful of gunpowder, a gill each of whisky and spirits of turpentine, thickened with sulphur to the consistency of ordinary salve or ointment. Before commencing its use take a dose of sulphur every night for a week. Three or four applications are usually sufficient to cure the Western or prairie itch.

Jaundice.—A decoction of dandelion root is an excellent remedy. Or, a table-spoonful of castile soap made fine, and mixed with new milk, and taken two or three times a day. Or, boil carrots thoroughly, drink the water in which they are cooked, and eat the carrots, so long as there may seem to be a necessity for continuing it. Or, a strong bitters made of the leaves, or bark of the root of the peach tree, taken in moderate doses three or four times a day. A strong decoction of boneset or thoroughwort, drinking two tea-cupsful at a time, once a day for a week or two; and the inner bark of barberry, steeped in cider is also excellent.

Kidney Inflammation.—Induce perspiration by first giving an emetic slowly, and then apply over the region of the kidneys a hot fomentation of hops, wormwood, and tansy, simmered in vinegar and water, thickened with a little bran; and use the following drops: Two ounces each of sweet spirits of niter and oil of sweet almonds, and one ounce of spirits of turpentine; mix, and give a tea-spoonful in a cup of warm spearmint tea every three hours during the day; also drink freely a decoction made of the leaves or root of marsh-mallow and mullen leaves, or of either of them, if both can

not be procured. Urinary difficulties proceeding from disordered kidneys, are treated under that head.

Lightning.—The most safe position in an unprotected house during a thunder storm, is a chair in the middle of the room with the feet on the rounds. When a person has been struck down by lightning, the body should be drenched freely with cold water, and do not get discouraged if animation is not immediately restored; continue the drenching for hours, for we have the record of animation being restored after a drenching of several hours.

Liniments for Rheumatism, etc.—Take one ounce each of aqua ammonia, oil of cedar, oil of sassafras, spirits of turpentine, oil of hemlock, oil origanum, and gum camphor, and two quarts of best alcohol; shake thoroughly, and apply with a flannel cloth before a hot fire or stove.

Put two ounces of pulverized Spanish flies into a pint of alcohol; after three days infusion strain off the tincture for external application.

Four ounces benzine, two of tincture camphor, and one each of chloroform and tincture of opium, and mix well. Apply by wetting a cloth or flannel with the liniment, and placing it on the affected part; then gently press a napkin, folded in several thicknesses, over the saturated cloth, as long as the patient can bear the burning sensation. It will not blister.

Take a pint each of brandy and soft soap, a little spirits of turpentine, and three large red peppers, and boil them down to about one half the original quantity, being careful that the fire does not reach over the vessel while boiling so as to endanger its becoming inflamed. This is an excellent liniment for rheumatism or other pains.

One pint alcohol, high proof, one ounce of oil origanum put into the alcohol and well shaken up to cut it thoroughly; then add two ounces each of sweet or olive oil, spirits of hartshorn and laudanum, each put in separately and well shaken before adding the next; one gill spirits of turpentine, two ounces each gum camphor, gum opium, and castile soap cut up fine, and a beef's gall. Simmer over a slow fire till well incorporated, making nearly a quart when bottled. This is a superior article of opodeldoo or liniment.

One of the most powerful liniments for the relief of severe pain, is made of equal quantities of spirits of hartshorn, sweet oil, and chloroform; dip into this a piece of cotton cloth

doubled, about the size of a silver dollar, lap it on the spot, hold a handkerchief over it so as to confine the fumes, and the pain immediately disappears. Do not let it remain on over a minute. Shake it well before using; keep the bottle closely stopped.

Mix half an ounce each of oil of origanum, sweet oil, oil of spike, turpentine, spirits of ammonia, brandy, and best alcohol, with a quarter of an ounce of gum camphor.

Take four ounces gum elastic, one ounce each of tincture of lobelia, oil of origanum, gum camphor cut in alcohol, olive or sweet oil, spirits of hartshorn, spirits of turpentine, and laudanum, adding a beef's gall if it can be had.

For a fresh cut or bruise, add to a pint of best alcohol one ounce of sal-ammoniac, well pulverized; when dissolved saturate a linen cloth and place it upon the wound, rewetting it as often as it gets dry.

An ounce each of sal-ammoniac and gum camphor, two ounces each of spirits of hartshorn and oil of sulphur, half a pint of oil or spirits of turpentine, in a pint of alcohol, well mixed.

To three ounces of alcohol add one-fourth of an ounce of cayenne pepper, half an ounce each of fine gum guaiac and gum camphor, let it stand a week, and add about half as much spirits of turpentine, when it will be ready for use.

Three ounces of oil of origanum, four ounces of aqua ammonia, two ounces of tincture of opium, half a pint of spirits of camphor, and alcohol enough with these ingredients to fill a quart bottle.

An ounce of tannin dissolved in an ounce of glycerine is an excellent remedy for chaps, sores, and excoriations. Equal parts of sweet oil, ammonia, and chloroform; or equal parts of chloroform and soap liniment; or equal parts of chloroform, extract of camphor, and extract laudanum, make superior family liniments.

Cure-All Liniment.—One pint of strong spirits of wine, two drams of alkanet root; let it stand two days, then add one dram of camphor, and strain through muslin, then add two drams each of opium and spirits of turpentine, and eight drams of origanum. It is good for cuts, fresh wounds, colic, pains in the stomach, etc.; for pain in the ear drop it on wool and apply it. For internal complaints take twenty or thirty drops on sugar.

Liquid Opodeldoo.—Two ounces castile soap, one ounce each gum opium and gum camphor, all cut fine; one ounce spirits of turpentine, all put in a quart of best alcohol. The opium

should be first put in the alcohol, frequently shaken up, for a week before adding the other ingredients. This makes an excellent strengthening liniment.

To Make British Oil.—Half a pint each of spirits of turpentine and linseed oil, Barbadoes tar, three ounces; oil of amber, two ounces; oil of juniper, half an ounce; mix well together.

Mix two ounces of oil of origanum, one each of oil of hemlock, oil of sassafras, and oil of wormwood, two ounces each of gum camphor and spirits of turpentine, one ounce of tincture of cantharides, in a quart of good alcohol.

An egg well beaten, half a pint of vinegar, one ounce of spirits of turpentine, quarter of an ounce each of spirits of wine and camphor, well incorporated, put into a bottle and shaken several minutes, and well corked. Three or four thorough applications a day for rheumatism, lumbago, sprains, chilblains, or bites of insects.

Liver Complaint.—Suitable injections should be frequently used; and when the pain in the side is severe, apply a plaster made of gum ammonia and squills, prepared in vinegar. Whatever tends to promote the urine is good in this case; half a dram of purified niter, or a tea-spoonful of sweet spirits of niter may be taken in a cup of the patient's drink, three or four times a day. Diet lightly, drinking buttermilk freely.

Another remedy is to make a strong tea or syrup of burdock and dandelion root, and use it freely; or of dandelion alone, taking a tea-cupful twice a day.

Liver and Spleen Obstructions, etc.—Take the leaves, wood, bark, and bark of the roots of bitter-sweet, steep out the strength, strain and sweeten into a syrup. Use in such doses as may seem best for liver and spleen obstructions; jaundice, dropsy, bruises, inward soreness, and coagulated blood.

Lock-Jaw.—The application of beef's gall to the wound will prevent lock-jaw. Besides its antispasmodic properties, the gall draws from the wound any particles of wood, glass, iron, or other substances that may cause irritation, when other applications have failed. Or, an application of warm lye, made as strong as possible, to the wound, either by plunging the limb into it, or bathing the part with flannel saturated with the lye. When the jaws are set pry them open, or pour down by the side of the mouth two parts of the tincture of lobelia to one of cayenne, in table-spoonful doses, and repeat frequently until relaxation is produced;

and, in severe cases, give injections of lobelia, cayenne, and laudanum.

Measles.—Mr. SWIFT, of Detroit, a gentleman whose statements the *Advertiser* asserts may be implicitly relied on, says: I wish to make known a treatment that will speedily cure and keep the measles on the surface of the skin until the disease turns, and will bring it out when it has struck in—though simple, it is sure: Take a pint of oats and put them into a tight vessel; pour on boiling water, and let it stand a short time; then give the decoction to the sick person to drink. It must be pretty warm. In fifteen minutes you will see a change for the better.

Give the patient plenty of cold water; use light, liquid food; wash or sponge occasionally with warm water and vinegar to allay the heat and itching of the skin. Also, use repeated towel baths, with cold water drink. Cold boiled rice and mellow uncooked apples have cured the measles. When the disease has been prevalent, those who take sulphur to purify the blood, as in case of the itch, escape it.

Menses.—*To bring on Timely Courses, when Obstructed.*—Steep the herb Jerusalem oak, known also as worm-seed, and drink it strong and freely. Or, use the essence of red cedar; or, elecampane in the form of a strong tea; or, a tea-spoonful of the powdered root of crane's-bill in a decoction of water or milk, taken three or four times a day. Or, a decoction of the common vervain root, taking half a tea-cupful three or four times a day. Or, take sixty grains each of the extract of dandelion and saltpeter, and twenty grains of ipecac, wet with molasses, made into common four-grain pills, and use as may seem necessary.

For *excessive or immoderate flow of the menses*, boil comfrey root in milk, and use it. Or, for an adult, take twenty drops of laudanum and five drops of oil of cinnamon, on loaf sugar, or in any other manner, repeated in half an hour in severe cases. Or, put two ounces of light-colored myrrh, made fine, and a fourth of an ounce of oil of cinnamon in a pint of good alcohol; let it stand a few days, shaking it up frequently before ready for use. For an adult, take a tea-spoonful three times a day. It is good also for excessive flow of urine. Or, isinglass dissolved in hot water, which will require four or five hours, and drank freely. A decoction of blackberry root is also an excellent remedy.

For *bearing down pains*, steep the roots of maiden's-hair in hot water, and drink freely until relief is obtained.

How to Extract a Needle.—A needle deeply imbedded in the muscles of the hip of a child, was extracted by passing the positive pole of a horse-shoe magnet, highly charged, over one extremity of the needle; in a few minutes the needle was readily discovered coming nearer the surface, and, in less than half an hour, the head was drawn through the skin and easily removed.

Nervousness.—I have known, observes a writer in the *Practical Farmer*, many men, and women too, who, from various causes, had become so affected with nervousness, that when they stretched out their hands they shook like aspen leaves on windy days—and by a moderate use of the blanched foot-stalks of celery leaves as a salad, they became as strong and steady in limb as other people. I have known others so very nervous that the least annoyance put them in a state of agitation, and they were almost in constant perplexity and fear, who were also effectually cured by the daily moderate use of blanched celery as a salad at meal times. I have known others cured, by using celery, for palpitation of the heart. Everybody engaged in labor weakening to the nerves, should use celery daily in season, and onions in its stead when not in season.

Neuralgia.—Dissolve half a dram of finely-pulverized sal-ammonia in an ounce of camphor water—not spirits of camphor—and take a tea-spoonful at a dose, repeating it several times, at intervals of five minutes, if the pain be not removed at once. A few minutes is often sufficient to relieve the worst cases.

Or, take two large table-spoonful of cologne and two tea-spoonful of fine salt; mix them together in a small bottle; every time you have any acute affection of the facial nerves, or neuralgia, simply breathe the fumes in your nose from the bottle, and you will be immediately relieved.

The severest cases of neuralgia are sometimes removed by painting the parts two or three times a day with a mixture composed of half an ounce of tincture of iodine and half a dram of the sulphate of morphine.

Take half an ounce each of sweet oil and chloroform, two drams gum camphor, a dram and a half of spirits of ammonia, and mix well together.

This disease has been cured by combining one part of belladonna extract with two parts of hog's lard, and rubbing the limb several times a day with it. Gentle purgatives should be used, with proper diet.

Obstinate cases of neuralgia, caused by variations of the weather, have been perfectly cured by covering all the painful parts with a coating of collodion containing hydrochlorate of morphine in the proportion of thirty grammes of the former to one of the latter. The relief is prompt and permanent, the coating falling off of itself in a day or two.

It is said that the juice of one lemon a day, taken in Winter, will cure the most obstinate case of neuralgia. No sugar should be taken, as it has a tendency to counteract the effects of the lemon juice.

Night Sweats.—Drink a gill or more of warm water at night in bed just after retiring. Or, take twenty drops of elixir vitriol in a little water, three times a day, and drink freely of a cold infusion of sage. Or, take thirty drops of acetic tincture of bloodroot, three times a day. A warm sponge bath at night, and a cold one on rising in the morning, wiping dry with a coarse towel, using considerable friction; or bathing the body occasionally with a weak decoction of white-oak bark; or with vinegar and whisky, has been found effective.

Ointments, Poultices, Plasters, and Salves.—Blue or mercurial ointment is thus made: Take one ounce well pulverized resin, pour on enough spirits of turpentine to cut or moisten it; then grind down in the mortar; then add four ounces quicksilver, and all well ground down; then melt and add twelve ounces old lard, not hot, and mix all well together.

Elder Ointment is excellent for burns, chapped hands, cows' cracked teats, and sores generally: Take of lard, the inner bark of sweet elder, and the inner bark of bitter-sweet root, equal parts in bulk, and two spoonful of balm of Gilead buds; simmer for half an hour, adding a little beeswax and mutton tallow. This is about the same as the golden ointment.

Glycerine Ointment is prepared by any druggist by simply rubbing a little glycerine into what is called "cold cream," just enough to give it a soft, lard-like consistency. It will keep a month or two, if well corked.

Plantain and house-leek, boiled in cream, and strained before it is put away to cool, makes a very cooling, soothing ointment; plantain leaves alone laid upon a wound are cooling and healing.

White-oak ointment is excellent for sores and bruises: Take a peck of the inside bark of white oak; boil in two pails of water until the strength is extracted; then remove the bark, and add half a pound of fresh butter, and sim-

mer to the consistency of molasses, being careful not to burn it.

Poultices are indispensable in allaying pain and inflammation, and in drawing gatherings to a head. Bread, or wheat flour, boiled in milk, mixed with a small portion of lard, constitutes a good suppurative poultice for local inflammations. Cumfrey root, or a fresh beet from the garden, bruised, makes a cooling and effective poultice. An application of warm stewed pumpkin, renewed every fifteen minutes, is especially good for inflammation of the bowels. The leaves of the common alder possesses great potency as a poultice. To prevent mortification, make a poultice of yeast and pulverized charcoal, and apply to the part affected; or, bathe with white lye; or put on a gunpowder poultice.

Mustard plasters on the feet, and ice-water on the head, with the patient in a warm bed, are good for convulsions. By using syrup or molasses for mustard plasters, they will keep soft and flexible, and not dry up and become hard, as when mixed with water. A thin paper or fine cloth should come between the plaster and the skin. The strength of the plaster is varied by the addition of more or less flour.

A good plaster to drive away any old enlargement or swelling of the glands, is made by mixing equal parts of powdered pokeroor and lard; or, take the fresh root, roast and bruise it, and bind it on the swollen part while hot.

Adhesive or Strengthening Plasters.—Melt together one pound of resin, two ounces each of beeswax and deer or mutton-tallow, and half an ounce each of camphor gum and balsam of fir; then add half a gill of alcohol, a few drops only at a time to prevent burning or running over. Then pour the whole into a pail of cold water, and work it like shoemaker's wax. Excellent for pains in the side, back, etc. Or, take two pounds of litharge plaster, and half a pound of frankincense, melt together, adding three ounces of red oxide of iron, and form it into a plaster. Or, take equal parts of Burgundy pitch and dragon's blood, or gum kino, melted together.

Salve Recipes.—A mixture of lard and Scotch snuff is very efficacious for fresh wounds. A salve for hurts caused by needles, pins, etc., may be made of rye flour, soap, and molasses; or the white of an egg beaten up with camphor. Sweet mutton tallow is an excellent healing salve.

Take one ounce lard, two ounces white-pine turpentine, half an ounce beeswax, half an

ounce resin, one ounce strained honey, and one-fourth ounce gum camphor made fine, when melted together, add slowly one ounce laudanum, stirring all the while till cold; if the laudanum were all added at once, it would cause the mass to run over. After taking some good purifying pill, this salve will cure salt-rheum, and other eruptions, or sores.

Melt together four ounces of white-pine turpentine, two ounces each of laudanum, lard and honey, one ounce each of beeswax and rosin, and half an ounce each of gum camphor and sugar of lead. A valuable salve is made by adding about ten per cent. of phenic or carbolic acid to butter or other fatty matter used for such purpose.

The well-known and popular *Green Mountain Salve* is thus made: To five pounds of resin, and four ounces each of beeswax, Burgundy pitch, and mutton or deer's tallow; an ounce each of the oils of hemlock, red cedar, and origanum, balsam of fir, Venice turpentine, and very finely-pulverized verdigris: Melt the resin, beeswax, Burgundy pitch, and tallow together, adding the oils, having rubbed the verdigris up with a little of the oils, and put in the other articles; stir well, and pour into cold water, working it like wax until cool enough to form into rolls. This is excellent for rheumatism, or local pain, or weaknesses.

Palsy—Paralysis.—Keep the bowels open, and take some good nervous pills, and tonic bitters. Fifteen grains of ergot taken every morning, acting, as supposed, upon the spinal marrow, has cured the palsy. An infusion of the fever-few herb, drank freely, cold, has proved a valuable remedy.

Piles.—Piles are principally occasioned by costiveness and cold, and not unfrequently by sedentary habits, and are too often neglected until they become very serious and difficult to cure. In the early stages, the whole difficulty can be removed by mild cathartics; but in advanced stages, when there is considerable inflammation or bleeding, cold water or astringent lotions should be applied; and, to arrest bleeding, continued pressure is more certain.

For external piles, a good ointment may be made of equal parts of lard, sulphur, and cream of tartar; or, half an ounce each of ointment of galls and stramonium ointment, and ten grains of sulphate of morphine, well incorporated, and applied night and morning.

A good bolus for internal piles: Powdered castile soap, one ounce; powdered muriate ammonia, one ounce; powdered jalapa, one ounce;

balsam copaiba, sufficient to make into bolus. Insert one every night.

Two parts of sugar of lead and one of saltpeter, ground down with sweet oil, for external application.

Make an ointment of stramonium leaves, or of celandine, and apply night and morning; if the blind piles, the ointment must be put up where the complaint is located. Drink tar water twice a day, and take a little of the essence of fir every night on retiring to rest. The blind piles are greatly relieved by the application of West India molasses.

Ward's Paste, a celebrated pile remedy, is made as follows: Eight ounces each of ground black pepper and dried elecampane root ground, four ounces of powdered fennel seed, and one pound each of honey and loaf sugar, mixed in a mortar to the consistence of paste; taking a portion as large as a chestnut four or five times a day, designed to regulate the bowels and strengthen the vessels of the affected parts. It is also an excellent preparation to overcome costiveness in general.

Steep a handful of low mallows (from which children pick and eat the little vegetable mucilaginous cheese) in about three gills of milk; strain it, and mix with it about half the quantity of molasses. Apply externally, as warm as agreeable.

A clergyman writes to the *Maine Farmer* that he cured himself from long continued piles by taking a tea-spoonful of sulphur every other day, mixed with a third of a cup of new milk, repeating it a few times.

Pills, Physic and Blood Purifiers.—For an excellent *ague*, *jaundice*, and *liver pill*, take equal parts of pulverized aloes and finely-scraped castile soap, mixed with honey, and make into common four-grain pills, taking one at a time, three times a day, until it acts upon the bowels; then omit three days, and then recommence, and so alternate till a cure is effected.

Anti-Bilious Pills.—One ounce each of aloes and gum gamboge, and one-eighth of an ounce each of cream of tartar and saltpeter, well pulverized and well mixed together; then wet with one-fourth of an ounce of essence of peppermint; if too wet, let the mass remain a few days, working it over occasionally. Make into a four-grain pill; from two to four is a common portion. A capital article.

Superior Anti-Bilious Pills.—One ounce of aloes, half an ounce each of fine jalap, calomel, and gum gamboge, and one-fourth ounce of gum guaiacum, all made fine and sifted, and

well mixed in their powdered state; then wet with two drams of as strong essence of peppermint as can be cut, and work over properly, and make into common four-grain pills. Take from two to four for an adult, an hour before breakfast, or at night before retiring; in case of a violent fever, continue taking them for three or four nights. To be worked off by water gruel.

These are invaluable pills to break up fevers and ague and fever. When ceasing to take the pills, in cases of fever, or ague and fever, take two grains of quinine every two hours till the fever is broken; then continue to take the same quantity of quinine, but only three times a day, for a week; then two grains a day for awhile—this to strengthen the system, and prevent a relapse. It may be taken in sweetened liquor. The quinine produces perspiration, which breaks the fever; it may be aided, if thought best, by herb drinks, warm foot baths, and body washing.

Draper's Anti-Bilious Pills.—One ounce of gum aloes, half an ounce each of gum gamboge, jalap, calomel, gum guaiacum, and saltpeter, all made fine, well mixed and wet with one-fourth of an ounce of essence of peppermint or cinnamon, or a strong tincture of camphor, and made into common four-grain pills. Dose—from two to four for an adult.

Blood Purifying Pills.—Take sixty grains of the extract of dandelion; if the dandelion should from cold or other cause be hard, hold it to the fire and mildly warm it; then add sixty grains of finely-pulverized and sifted saltpeter, and work it in thoroughly with the hands. Then lay it aside for twenty-four hours; hold it to the fire to soften, and again thoroughly work it, and add twenty grains of pulverized colocynth, or bitter apple, well worked in the same as the saltpeter. Make into thirty-five or forty pills; take one at a time three times a day an hour before breakfast and dinner, and just before retiring for the night. If too relaxing, lessen the quantity; but one or more should be taken each day till the system is thoroughly cleansed.

For those who prefer to take their medicine in liquid form, put the above three articles in a bottle, with about thirty-five tea-spoonful of alcohol, or good whisky; let it stand a week before the strength will be sufficiently extracted for use. A dose—a tea-spoonful three times a day, taken as above; but if the articles are not properly cut and dissolved, double the quantity of alcohol, and, of course, double the dose.

Dr. Sappington's Celebrated Anti-Fever Pills.—Sulphate of quinine, forty grains; gum myrrh, ten grains; liquorice, thirty grains; well mixed; moisten with a little water, and add just enough of the oil of sassafras to impart an agreeable odor. Divide into forty pills; one for a dose, to be repeated every one or two hours, or longer, to suit the case.

These pills, for fever, are the result of nearly fifty years' experience, and are based on the theory that tonics, and not irritants, are what is required in cases of fever; and that quinine is really a tonic, and not a stimulant.

Hooper's Female Pills.—Take of aloes eight ounces, sulphate of iron (copperas) dried, two and a quarter ounces, canella, ginger, castile soap, each one ounce, myrrh, extract of black hellebore, each two ounces. Powder the dry articles and beat the whole into a mass with syrup, and divide into pills of two and a half grains each. Dose—three to four pills.

Liver Pills.—Take of cayenne pepper half a dram, fifteen grains each of bloodroot and ipsecac, each to be pulverized, and all well mixed with from thirty to sixty grains of the extract of dandelion, and fifteen grains of the extract of mandrake or May-apple, together with ten or fifteen drops of the oil of anise cut in a dram of alcohol, seven ounces of wine or good whisky, or three and a half ounces of alcohol. Then form the compound into pill mass, and roll it into forty-eight pills. From two to four pills are an active cathartic, while one pill every night on retiring will be found a most excellent corrective of the liver. This quantity may be put into forty-eight tea-spoonsful of currant or grape wine, and taken in the liquid form, a tea-spoonful equaling one pill.

Anti-Nervous Pills.—Take fifteen grains each of valerianate of zinc, pulverized loaf sugar, and gum arabic made fine, wet with a few drops of water and mixed well together. Leave it in pill mass for a day or two to become properly incorporated, and then roll in flour and make into pills. Take one or two pills at a time, and three or four times a day, to quiet the nerves and produce sleep.

Another superior anti-nervous pill, very useful in bad dyspepsia, nervous headache, sleeplessness, confusion of thought, and palpitation of the heart, is thus made: Take thirty grains of alcoholic extract of Ignatia amara or St. Ignatius bean, and ten grains of powdered gum arabic; make into forty pills; one pill to be taken an hour before breakfast and one an hour

before retiring at night—only half a pill for the young, the aged, and the delicate.

Purgative and Tonic Pills.—Take extract of colocynth three grains, extract of hyoscyamus one grain, sulphate ferri one grain, and extract of jalap one grain, worked together and made into pills of proper size.

A Mild Physic Cordial.—Two ounces pounded liquorice root and one ounce anise-seed steeped half a day; half a pint of liquid when done. Strain and bottle it while hot; then add an ounce of pulverized rhubarb, shaking the whole well. Next day add half a pint of some good distilled liquor. A dose from two to eight tea-spoonsful.

Or, cut one dram of oil of anise in two ounces good alcohol, and add one ounce of rhubarb and two ounces of liquorice root or stick, steeped in water, reduced to half a pint when done; then strain, and add half a pint of good brandy or whisky.

A Mild Physic for Fevers.—Equal proportions of rhubarb, senna, liquorice root or stick, and anise-seed, steeped in water until strong, and strained; and give a tea-spoonful or more once an hour until it operates.

Hull's Physic.—Take of myrrh, cinnamon, mace, cloves, saffron, ginger, each one ounce, aloes eight ounces, sal-niter two ounces; powder, mix, and sift. Dose—half dram. Good in colic, etc.

An Excellent Purgative.—Small doses of salts, in a tumbler of cold water, sweetened with syrups, are excellent purgatives in many cases.

Blood Purifier.—A decoction of the flowers of the common alder, or the bark of the roots boiled in cider, taking a tea-cupful every hour or two until it moves the bowels, and then less, is an excellent blood purifier.

Or, make a decoction of equal parts of the roots of blue flag, burdock, and yellow dock, and of sassafras, dogwood, and black or tag elder bark, and drink it once or twice a day.

Or, take two ounces each of yellow dock and yellow parilla root, and one ounce each of poke and blue-flag root, bruise and put them into a quart of whisky; shake up repeatedly for three days. Dose—two tea-spoonsful three times a day.

Physic for Children.—Mild cathartics only should be given to children, such as cold-pressed castor oil, rhubarb, and magnesia. Herb teas aid nature in her efforts. Syrup of ipecac is excellent for colds, coughs, or stoppages of the respiratory organs.

Rhubarb and Magnesia for Children.—Mix one dram of powdered rhubarb with two drams of carbonate of magnesia, and half a dram of ginger. Dose—from fifteen grains to one dram.

Compound Soda Physic for Children.—Mix one dram of calomel, five drams of sesquicarbonate of soda, and ten drams of compound chalk; powder together. Dose—five grains; a mild purgative for children during teething.

Pleurisy.—Give tea-spoonful doses of equal parts of tincture of lobelia and Thomson's No. 6, or tincture of cayenne in place of the latter, repeated every ten minutes until four or five doses are taken—ten to fifteen drops of laudanum may be added to each of the first three doses. Bathe the feet, and drink warm tea—the best is made of equal parts of pleurisy root, boneset, and bloodroot; and prepare the system for a thorough emetic of lobelia and ipecac, given in connection with the above tea. Put about the patient in bed bottles of hot water or hot brick or stone, and apply a mustard plaster over the seat of the inflammation. Continue the tea, giving occasional doses of the tincture compound, keeping up the sweating; if possible, for twelve hours, and then give a cathartic. The treatment of chronic pleurisy should be milder—a mild emetic about once a week, in broken doses, occupying fully an hour; bathing the lower extremities in lye, or salt water, or alternating them, daily, with faithful rubbing. Then apply a plaster made of Burgundy pitch, resin, and beeswax, melted together, stirring in a little finely-pulverized bloodroot, May-apple root, and poke root; and repeating it for weeks perhaps until pustules are produced.

Pimples, Styes, and Eruptions.—Touch them, in their first stages, with spirits of turpentine every six hours. Or, dilute corrosive sublimate with the oil of almonds, and apply to the face occasionally for a few days.

Poisons.—Poisons are introduced into the system by various means. They are often concealed in food by the ignorant cook or house-keeper, and as ignorantly partaken of by herself and others. Pickles are often poisoned by being scalded in brass or copper kettles; it makes them look green, but that greenness renders them poisonous. Brass or copper vessels ought not to be used for any purpose, unless they are previously scoured very bright; it is better for health to avoid their use for cooking purposes altogether. Brass wash-dishes ought never to be used; they cause sore eyes, eruptions, etc. Water is poisoned by being con-

veyed in lead pipes, or standing in pails painted in the inside. Milk is poisoned by using such pails for milking. Cheese is often poisoned in the same way, and by using, in manufacture, brass, copper, or wooden tubes painted inside.

Ignorance often places a deadly weapon in our choicest articles of food, but selfishness often conceals a greater. It manufactures and commends poison for others in many temptingly disguised forms. Candies, toys and cakes are ornamented or colored with various poisons. The blending of colors in various ways, in candies or cakes, makes them attractive to the eye, but destructive to the health of those who use them. Cakes, ornamented with colored dust, candies colored in such nice style, toys so highly attractive to children, cause decayed teeth, canker, intestinal inflammation, nauseating headache, colic, spasms and often convulsions. Confectionery may be prepared without coloring material, so as to be wholesome. Gay colors are made of poisonous materials, that ought never to be introduced into food or drinks.

Wall paper ornamented with beautiful green, pretty yellow and lively red, often diffuses through sleeping and sitting-rooms an atmosphere impregnated with a poisonous vapor that causes headache, nausea, dryness of the mouth and throat, cough, depression of spirits, prostration of strength, nervous affections, boils, watery swellings of the face, cutaneous affections, and inflammations of the eyes. These occur in more serious forms in apartments that are not constantly and thoroughly ventilated.

Poisons are either "corrosive," such as kill or destroy the texture of the part; or, "constitutional," affecting the system through the nerves and blood-vessels. Mineral and acid poisons, as lead, copper, arsenic, oxalic acid, aqua fortis, and the like, kill the living parts on the instant of touching, and death speedily results from inflammation, swelling, and mortification. Alcohol, opium, prussic acid, strychnine, and the like, are constitutional, and affect the system through the nerves and blood-vessels. There are, besides the gases, over sixty solid substances in nature which destroy life in a day, an hour, a minute.

An antidote is that which instantly renders a poison innocuous by removal, or chemical combination. For corrosive poisons, such as mineral and acid, indicated certainly by the patient carrying the hand to the throat, swallow instantly two gills or more of sweet oil, train oil, melted butter, or any other simple oil or

grease first at hand. This soothes, protects, and vomits. Or take magnesia, powdered chalk, soap, or saleratus, in water. As to the constitutional poisons, give instantly a heaping teaspoonful each of salt and mustard, stirred quickly in a glass of cool or warm water. This usually causes instantaneous vomiting; if not, repeat till it does. As soon as the vomiting ceases, as there may be some of the poison left in the stomach, swallow the white of an egg or two; and to make assurance doubly sure, drink freely of very strong coffee. The egg is the best for corrosive poisons; the coffee for the constitutional. Coffee is the antidote for a larger number of poisons than any other substance in nature.

Sliced onion, in a raw state, will collect and draw poison from the human system, when taken internally; or externally applied to the arm-pits, and frequently renewed.

Cyanide of potassium, extensively used in electro-plating and other processes, sometimes produces painful ulcers on the hands of those who use it. The most effectual remedy for which is the protosulphate of iron, in fine powder, thoroughly mixed with raw linseed oil, and applied to the parts affected.

Poisonous Bites.—The treatment for hydrophobia has been already fully considered. In large numbers of well-attested cases in our country, the poison from the bite of rabid dogs and rattlesnakes, has been completely extracted by the application of the mad-stone—a porous stone, resembling the piece of lava used by painters. This stone, applied to the wound, adheres firmly; after two or three hours, it is taken off, soaked in warm water to divest it of the poison it has absorbed, and thus applied till the virus is entirely extracted, when it will cease to adhere, and the greenish poisonous matter no longer appear on the water. It is idle to ridicule the successful effects of this simple remedy of nature. Whether cupping, or some other powerful drawing remedies may not produce the same results, should be faithfully tested, as some substitute for the mad-stone, accessible to all, is greatly needed. Mrs. TAYLOR, of Terre Haute, and JOSEPH BAUGH, near Bloomington, Indiana, possess mad-stones which have for many years cured every case in which they have been used. A quarry of mad-stone is said to have been recently discovered by Rev. E. T. RITCHER, on his farm, a few miles from Indianapolis.

Snake Bites.—Several years ago the Smithsonian Institute commenced a series of experi-

ments, testing the practicability of neutralizing the poison of snakes, founded purely on a chemical basis, which developed great results. The fact was illustrated that the poison of the most venomous rattlesnake can be neutralized in an incredibly short time. After the most extraordinary results from all the experiments witnessed, there was promulgated from the Institute, at the time above mentioned, the following simple but certain cure for snake bites, and for the sting of all kinds of insects: Thirty grains of iodide of potassium, thirty grains of iodine, one ounce of water; applied externally to the wound by saturating lint or batting—the bite to be kept moist with the antidote until the cure is effected, which will be in one hour, and sometimes instantly. The limb bitten should be corded tight to prevent circulation. The liquid should be kept in a phial with a glass stopper.

Use whisky or other liquor freely until intoxication is produced—it is a certain neutralizer of the poison, and is coming into general use for this purpose by the intelligent and observant practitioners of medicine. A bottle of whisky, mouth downward, has been applied to a poisonous snake bite; the whisky gradually becomes darker and the discoloration round the bite diminished, until at last the whole of the poison appeared to have been absorbed by the spirit. Sweet or olive oil is a reliable remedy, taking a table-spoonful of it internally, and bathing the wound with it.

The universal remedy in the reptile country of Bombay for snake bites is *liquor ammoniæ fortior*, or *strong solution of ammonia*: Doses, for an adult, thirty-five drops in a wine-glass of water; eight to twelve years old, about half the quantity of ammonia and water; four to eight years old, ten to fifteen drops in a fourth of a wine-glass of water. This is asserted to be a cure for hydrophobia in its worst form.

One table-spoonful each of gunpowder and salt, and the yolk of an egg, all beaten together, and applied as a plaster to the wound. A yellow water will issue; and when the plaster becomes soaked with the poison it will drop off; when it should be renewed, and so continued till it will adhere a long time—evidence that the poison has all been drawn from the wound.

An Indian remedy is to pound up sweet-flag root and apply it in its green state as a poultice; if dry, boil it in chamber lye, and repeat the application; it is cooling and drawing, and regarded as a certain remedy. Or, use a poultice

of blue clay and gunpowder, wet with chamber lye, and repeat.

A strong decoction of white-ash leaves, taken internally, and also applied to the wound, is represented as an antidote to the bite of a rattlesnake. The application of cold water as a douche, or the wet sheet so as to produce considerable sweating, has proved successful.

For Bee-Stings, Spider-Bites, and Ivy Poison, bathe the parts with sweet oil; or hartshorn or turpentine; or wet the wound, and bind on salt alone, or mixed with the yolk of an egg; or bind sliced onions over the spot; or wash with a strong decoction of white-oak bark.

Polypus.—Polypus, a fungus growth of the nose, is readily cured when small by the use of finely-powdered bloodroot as a snuff, and mixed with water and used as a nose gargle. Or, use a snuff composed of equal parts of finely-pulverized bayberry bark and May-apple root, and as much as both of these of bloodroot. The snuff may be alternated, every few days, with the following treatment: Dissolve two drams of sulphate of zinc in two ounces of tincture of bloodroot, and with it saturate lint or cotton, and placing it upon the polypus, and plug up that nostril with cotton so as to keep the lint in its place.

For Prickly Heat in Children.—For a cooling drink, take a little lemon juice, or acid dissolved in gum arabic solution, in water properly sweetened to apply rye flour to the skin, and keep the child from exercising during the heat of the day, is an effectual treatment.

Quinsy and Sore Throat.—For quinsy make a strong decoction from smartweed, and drink it freely, applying the steeped herbs to the neck, and leaving them on all night. Or, first take an emetic, drinking warm sage tea to aid it; and boil a handful each of hops, wormwood, sage, boneset, hoarhound, and catnip, or as many of them as can be had; put the whole in a coffee-pot, and inhale the vapor as warm as it can be borne. Use for external application a liniment made of one ounce each of oils of sassafras, hemlock, pennyroyal, and sweet oil, spirits of hartshorn, spirits of camphor, spirits of turpentine, and tincture of cayenne—bathing the neck and throat frequently, keeping the neck meanwhile well bandaged with flannel. The oil of hemlock alone is an excellent application.

For sore throat, dissolve a table-spoonful of salt in half a tumbler of water, and use it as a gargle. Or, take twenty drops of spirits of turpentine on loaf sugar every night, till cured;

black currant jelly will hasten the cure. Or, mix a penny's worth of pounded camphor with a wine-glass of brandy; pour a small quantity on a lump of sugar, and allow it to dissolve in the mouth every hour. Or, use as a gargle a tea-spoonful of chlorate of potash in a tumbler of water. Or, put two table-spoonsful of ashes in one pint of boiling water, to which, after being strained, add two tea-spoonsful of table salt, a piece of alum, and one of saltpeter, each the size of a nutmeg, the juice of three limes, or a little vinegar or orange juice, all sweetened with honey, and when cold, gargle the throat every three hours. Or, take one ounce of water, two drams each of gum arabic and white sugar, one dram of iodide of potash, and half a dram of iodine; mix, and keep in a phial with a glass stopper. This wash is to be applied to the back part of the throat, the tonsils and root of the tongue, with a camel's hair brush, the tongue being depressed with a spoon handle or other suitable instrument.

Rheumatism.—Among the liniment recipes already given, are several especially efficacious in rheumatic affections. Diet not unfrequently has quite as much to do as exposure in producing rheumatism. One man in Ohio who had been subject to this complaint for several years, left off the use of pork, and the rheumatism subsided; but recommencing its use, his old complaint returned to vex him.

Two table-spoonsful of castor oil, and one tea-spoonful of spirits of turpentine; heat these together, then rub hard the part affected with a piece of flannel saturated with the mixture; and bind on the flannel upon retiring to bed well saturated with the warm preparation.

Dissolve one ounce gum guaiac in a pint of strong brandy or alcohol, and take a table-spoonful morning, noon, and night, and bathe the affected parts with alcohol, or some good liniment.

Take twenty to thirty drops of the tincture of gum guaiac in sweet cream or milk, increasing the quantity as the patient can bear it. This will restore the sluggish action of the blood in cases of rheumatism, or palpitation of the heart.

Put one grain of iodine in a gallon of water, and drink two pints daily of this iodine water; and stay an hour daily in a hot-salt bath, at one hundred degrees; using some mild cathartic to move the bowels.

Boil a small pot full of potatoes, and bathe the parts affected with the water in which the potatoes were boiled, as hot as it can be applied

immediately before going to bed. The pains will be removed, or greatly alleviated by next morning. A poultice of finely-grated raw poke-root has proved highly efficacious.

Rheumatic Drops, or Thomsonian No. 6, a stimulant and tonic, and an excellent remedy for rheumatism, bruises, hemorrhage, wounds, sores, and strains, is thus made: Take gum myrrh, one pound; golden seal, four ounces; African cayenne, one ounce; put these into a jug with two quarts best brandy; shake several times a day for eight or ten days, when it is fit for use. Dose—from one to two tea-spoonsful in warm water.

Take of pulverized colchicum from five to eight grains every hour until it produces vomiting, purging, or perspiration. When nausea takes place, give a piece of sugar wet with brandy or cologne; and, when the stomach will bear it, a cup of warm tea, and let the patient sleep. The colchicum should be very finely pulverized, and preserved by mixing it with three times the quantity of pulverized loaf sugar.

For *inflammatory rheumatism*, take one ounce each of sulphur and saltpeter, half an ounce of gum guaiac, and one-fourth of an ounce each of colchicum root and nutmegs, each well pulverized, and all mixed in good syrup or molasses. Take one tea-spoonful three times a day; in severe cases an adult may take two tea-spoonsful at a time. It should be well shaken each time before taking. Also bathe the parts affected with half an ounce of pulverized saltpeter in half a pint of sweet oil. Or, make a poultice of stewed pumpkin, apply it warm to the affected part, renewing it every fifteen minutes, until a cure is produced, which is ordinarily in a short time. The fever drawn out by the poultice makes it extremely offensive when taken off.

Lemon juice is recommended as a frequent cure for *acute rheumatism*. It is given in quantities of a table-spoonful to twice the quantity of cold water, with sugar, every hour. The effect of the lemon juice was almost instantaneous in one case mentioned; in ten days the worst case was cured, and in seven the other was able to go out, and there was a flexibility of the joints of the cured, quite unusual in recovery after other modes of treatment. Acute rheumatism has been cured by taking four or five drops of saturated tincture of aconite.

The water-cure treatment for rheumatism is the use of the rubbing wet sheet; the douche applied to the spine and parts affected; daily

tepid bath; occasional wet-sheet packs; a wet bandage applied to the diseased parts, with plain and simple diet.

Rickets.—Should be treated in the main as a case of scrofula. If proper treatment is commenced early, deformity may be prevented. Wash twice a day with salt and water, commencing with the water slightly warm, and gradually using it colder, until quite cold; apply stimulating liniments to the spine and joints once or twice a day. Occasionally bathe the surface with astringent tonics, as a decoction of white oak and dogwood bark. Pure air, plenty of sunshine, abundant exercise, daily ablutions, and a strictly fruit and farinaceous diet, are the essentials of the remedial plan.

Ringworm.—Small red rings containing a thin acrid fluid, which sometimes itch intolerably. Wash the affected parts with soap and water, and apply mercurial ointment. Or, boil tobacco leaves well, adding vinegar and strong lye to the liquor, and with it wash the affected parts. Or, anoint several times a day with castor oil. Balsam of Peru, melted with an equal quantity of tallow, makes an excellent ointment for ringworm and scaldhead. By adding half an ounce each of tincture of blood-root, tincture of lobelia, tincture of stramonium-seeds, and oil of cedar, an infallible remedy for ringworm and tetter is provided. Apply wet gunpowder on the ringworm on retiring at night.

Scaldhead.—A disease principally confined to children. Pills, sulphur, or blood purifying syrups are necessary; wash the head daily in tepid water—about seventy-five degrees, and give a hot and cold foot bath at bed-time, with a coarse and opening diet. A good ointment is sometimes applied with advantage; but the scalp should not be combed so as to wound it, and cause it to bleed.

Scurf on the Head of Infants.—A simple and effectual remedy. Into a pint of water drop a lump of fresh quicklime the size of a walnut; let it stand all night, then pour the water off clear from the sediment or deposit, add a quarter of a pint of the best vinegar, and wash the head with the mixture. Perfectly harmless; only wet the roots of the hair. Or, rub together two ounces of lard and two drams of diluted sulphuric acid, and anoint the head twice a day.

Scrofula or Salt-Rheum.—It proceeds from some inherent poison in the system. The blood must be purified. An excellent alterative syrup for scrofula, and all diseases arising from im-

purity of the blood, is thus made: Two ounces each of yellow dock, yellow parilla, prickly ash, burdock, sarsaparilla, wintergreen, blue flag, and bitter-sweet. Put all together, in a crude state, and steep in three quarts of water till evaporated to one, when strained. Now add one pint good London dock or Holland gin, one ounce extract of dandelion, and one ounce of sulphur; sweeten with loaf sugar to taste. Dose—a table-spoonful three times a day before meals. If the bowels be costive, add one ounce pulverized rhubarb to the mixture.

Or, take a handful of common sarsaparilla, one-fourth of an ounce of seneca snakeroot, and boil slowly in one quart of water, in a closed vessel, down to a pint. To this add forty grains of calomel. When you begin using it, take one-fourth of a wine-glassful night and morning, and keep taking the dose that will cause three or four stools a day, always shaking the bottle well before taking it. If the mouth gets sore, stop taking it awhile. Substitute for it one day in each week a dose of salts. Drink burdock-root tea. Keep clean; live low, on rice, skim milk, etc. Take horseback exercise.

If a fever attend the case, take some salts every day or two, and use the following ointment: Make a strong decoction of equal parts of the bark of the root of the river willow, skunk's cabbage, and blue-flag roots; strain, and add a portion of lard to it, and boil down until the water is all evaporated. When cold, it is ready for use.

Or, put one grain of iodine to a gallon of water, and drink four half-pint glasses of the iodine water before breakfast; take a warm salt bath, at ninety degrees, daily; and if the pulse is hard, use antimonial wine at night.

The late NICHOLAS LONGWORTH, of Cincinnati, tested the following remedy for scrofula so thoroughly, that he caused the recipe to be printed, and sent to all who desired it: Put one ounce of aqua fortis in a bowl or saucer, drop into it a piece or pieces of copper the size of two copper cents, which will produce effervescence; when the effervescence ceases, add two ounces of strong vinegar. The fluid will be a dark green color. Wash the sore with water, and then apply this liquid to it, morning and evening, with a soft brush or rag. It should and will cause the affected part to smart; if too severely, put in a little rain water.

The water-cure treatment is designed to draw out the poisonous matter from the system through every pore, making it palpable upon every sheet and bandage. Alternate packings in

the wet sheet and dry blankets—wet-sheet packs an hour or longer, and blanket packs until a full perspiration is induced; each followed by a cold-water bath, and bandages night and day; tepid-sitz bath, with a pure diet, and much outdoor exercise.

Scurvy.—Use either the juice, or a decoction of burdock root—using a wine-glass of the juice, or half a pint of the decoction, three times a day. Onions are an infallible cure for this disease—eaten plentifully.

Sea-Sickness.—A horizontal position in the middle of the vessel, and a tight bandage over the abdomen, is an effectual remedy.

Sleeplessness.—If the cause is known, rectify it; if by tea or coffee, or other strong stimulants, cease their use, at night especially. Care should be taken, not to go to bed with cold feet or stomach long empty. Many devices for inducing somnolence have been practiced with more or less success; one of these is combing the hair, which has a very soothing effect on some persons. Another is to have the feet gently shampooed. Walking about the bedroom in one's night-dress, so as to get what Dr. FRANKLIN called an air bath, is a good plan; and the cold-water bath just before retiring to rest, by virtue of its stimulating action, is often successful. In more refractory cases, the warm bath may be tried—it acts by withdrawing the blood from the brain. On the same principle, the upright position, by favoring the return of blood from the head, is sometimes useful. It is indeed no uncommon thing to meet people who sleep with great facility when sitting in a chair, or in a carriage, but who sleep with difficulty when lying down in a bed.

To induce sleep in case of wakefulness in fever, apply a tobacco leaf to the scalp; or, in ordinary cases, take a grain or two of camphor at bed-time.

Skin Diseases and Eruptions.—The several diseases coming under this general head have been treated separately. One of the best external applications, after taking proper purifiers, for many eruptive diseases of the skin, is a strong decoction of hops, in which, when perfectly cold, the limbs or other affected parts should be bathed several times a day. A hot-salt bath is one of the most powerful tonics which can be employed in the various skin diseases so prevalent in new countries. An ointment may be made of twenty, forty, or sixty grains, as the desired strength may be required, of hydriodate of potash, rubbed into a fine powder, and well mixed with a half ounce each of

lard and spermaceti. This gently rubbed on the diseased surface several times a day, will allay the burning and itching. An excellent wash for eruptions is made by taking half an ounce of dried, unmanufactured tobacco leaves; pour on a pint of boiling water, and let it stand an hour; strain, and add thirty drops of creosote. With this bathe the parts frequently during the day, and lay upon them at night cloths or cotton moistened with the infusion.

Small-Pox.—Early vaccination is strongly advised by the best medical men in this country and Europe. This subject was reported on by an able committee to the French Academy of Science, through M. DEPAUL, stating that the researches of the committee tended to show that this operation is not more dangerous during the first week of the birth than at the second or third month. Delays are dangerous! "If all children," continued M. DEPAUL, "were vaccinated within the first two or three days after birth, small-pox, already rare now in comparison with what it was formerly, would, we are convinced, completely disappear."

Dr. HALL, in his *Journal of Health*, gives the following general deductions from extended and close observation, in regard to the subject of vaccination for small-pox:

"1. Infantile vaccination is an almost perfect safeguard, until the fourteenth year.

"2. At the beginning of fourteen the system gradually loses its capability of resistance, until about twenty-one, when many persons become almost as liable to small-pox as if they had not been vaccinated.

"3. This liability remains in full force until about forty-two, when the susceptibility begins to decline and continues for seven years to grow less and less, becoming extinct at about fifty, the period of life when the general revolution of the body begins to take place, during which the system yields to decay or takes a new lease of life, for two or three terms of seven years each.

"4. The great practical use to be made of these statements is—let every youth be revaccinated on entering fourteen. Let several attempts be made, so as to be certain of safety. As the malady is more liable to prevail in cities during Winter, special attention is invited to the subject at that time."

Small-Pox Remedies.—The small-pox remedy which cured thousands of cases in England, taken in all stages of the disease, is so simple that it can not be too widely disseminated. It is, cream of tartar, three-quarters of an ounce;

rhubarb, thirteen grains; cold water, one pint. In severe cases, a half a pint dose should be administered; and a less quantity in milder cases, or for children. The mixture should be well stirred, or shaken, immediately before administering it. When applied in the earliest stage of the eruption, the eruption is arrested, and suppuration prevented, without any injurious result. In cases characterized by delirium, great benefit has been obtained by applying a bottle of hot water to the feet. Plenty of fresh air is important, and an out-door airing, at the earliest period practicable, is recommended.

Another remedy, highly recommended by a member of the Royal College of Surgeons of England, and promulgated by the most scientific school of medicine in the world—that of Paris—and which has been successfully tested in California, by curing cases so far gone that the physicians said they must die; and also in promptly curing cases of scarlet fever: One grain each of sulphate of zinc (better known as white vitriol) and powdered fox glove, or digitalis (valuable in the ratio of its green color—the dark should be rejected); these should be thoroughly rubbed in a mortar or other vessel, with a few drops of water. When well incorporated, add four ounces of water, with some syrup or sugar. Dose—a table-spoonful to an adult, and two tea-spoonfuls to a child, every second hour, until the symptoms disappear, which is usually in twelve hours. The herb, by its febrile qualities, lays hold of the fever, which it immediately strangles, while the zinc acts the part of a tonic, instantly restoring equilibrium. Should the bowels become constipated in the progress of the disease, not a common occurrence, a pill made of a dram of the compound powder of jalap and one grain of fox glove, mixed with a little syrup or sugar, should be given an adult, and half that quantity to a child.

A remedy largely in practice in China, where it is esteemed one of the greatest medical discoveries of modern times, is: When the preceding fever is at its height, and just before the eruption appears, rub the chest with croton oil and tartaric ointment. This causes the whole of the eruption to appear on that part of the body, to the relief of the rest. It also secures a full and complete eruption, and thus prevents the disease from attacking internal organs. This is said to be the established mode of treatment in the English army in China, and is regarded as a perfect cure.

It has been asserted, apparently on good au-

thority, that in a place where hundreds of cases occurred, the following remedy was used as a curative, and also as preventive from taking the small-pox—even those who had never been vaccinated exposing themselves to the disease with impunity: One ounce of the root of *saracenia purpurea*, familiarly called ladies' saddle, or water cup, or fly trap; pour over it a pint of hot water, and let it steep on the stove half an hour; then pour off the liquid into a bottle, and take a tea-spoonful three times daily. The effect is to allay the fever and irritation caused by the formation of postules, the latter drying away rapidly, leaving slight, if any, traces of the disease.

The following prescription is vouched for by the Eastport (Maine) *Sentinel*, as a cure for the small-pox, corroborated by Dr. W. FIELDS, of Delaware: Give to the patient two table-spoonful of hop yeast and water, sweetened with molasses, so as to be palatable—equal parts of each—threetimes a day. Diet: Boiled rice and milk, and toasted bread, moistened with water, and without butter. Eat no meat. Give catnip tea as often as the patient is thirsty. Give physic when necessary. If the above treatment is strictly followed, no marks of small-pox will remain.

To Allay Irritation and Pitting in Small-Pox. One of the most remarkable discoveries, made by an old resident physician of Cincinnati to allay the irritation of small-pox, is to dust the patient every few hours with lycopodium, an American and European plant, commonly called club-moss. Use for the purpose a common powder-puff. It will also prevent pitting. SOLON ROBINSON and others have strongly recommended to dissolve collodion in alcohol, and apply all over the face with a soft brush, making an almost air-tight protection, and preventing any scars from small-pox; but Dr. CHRISTEN, of Prague, condemns its use for this purpose, as driving the disease within, and producing positive injury. To prevent pitting it is safest to rely on the yeast and lycopodium remedies.

Somnambulism.—A person whose son was addicted to night-walking in his sleep, placed a pail of cold water over the door of the child's bedroom, in such a manner that when the door opened the somnambulist received its contents over his head and shoulders. Ten experiments with this treatment were required, and the boy is now entirely broken of his habit.

Soothing Syrup for Children.—Take simple syrup, two ounces; half a dram of oil of anise,

and one dram of the best alcohol. Mix the oil and alcohol, then gradually add the syrup, continually rubbing in a clean mortar.

Or, take syrup of poppies, one ounce; water of anise-seed, three ounces; catawba brandy, half ounce; mix. This is a most excellent remedy for children teething, or belly-ache, so called in infants. Dose—a tea-spoonful as required.

Sore Breast and Nipples.—Avoid all applications of a poisonous nature, which, though carefully washed off, may yet be imbibed in small portions by the sucking infant. Moisten the nipples two or three times a day for some weeks before suckling, with brandy or whisky, slightly acidulated with diluted sulphuric acid.

Another remedy is, equal parts by weight of glycerine and tannin, dissolving the tannin in the glycerine, applied to the nipples. Or, apply a mixture of warm spirits of turpentine and camphor. Or, for sore breasts apply over the whole surface an ointment made by simmering a little of the bark of bitter-sweet, or some bruised smart weed, in mutton tallow. Or, for sore nipples, pour boiling water on nut-galls (or oak bark, if galls can not be obtained) and when cold strain it off and bathe the parts with it, or dip a cloth in the tea and apply it; or, twenty grains of tannin may be dissolved in an ounce of water, and applied. The application of a few drops of collodion to the raw surface, has been highly recommended by some physicians. It forms, when dry, a perfect coating over the diseased surface. The balsam of fir, applied in small quantities, is excellent for the sore nipples of nursing females.

Sour Stomach.—Lime water, taken in doses of four to five ounces, is a fine corrective for a sour stomach. When this fails, use lemon juice or muriatic acid, from twenty to forty drops in a cup of water, three times a day. Purified charcoal being an absorbent and remover of putrefaction, and operating as a stimulant to the bowels, may be used with advantage in cases of sour stomach, attended with costiveness.

Sprains and Stiff Joints.—In addition to the liniment remedies already given, some special applications may be mentioned. Fill a small bag partly with salt, and quilt it several times across to hold the salt in place, bind it upon the affected part, keeping it saturated with a strong decoction of wormwood and hot vinegar. Or, make a liniment or poultice of common salt, sweet milk, and wormwood, applying it with a flannel bandage as hot as it can be borne.

Sun-Stroke.—Dr. JAMES FISCHER, of St. Louis, recommends that families keep on hand

the following preparation, during the hot Summer season, for persons suffering from sun-stroke, or overcome with severe heat, the cost of which would be only about fifty cents: One handful of common salt, three ounces of aqua ammonia, two ounces of spirits of nitric ether, and one ounce of spirits of camphor. The salt should be dissolved in a quart bottle about three-fourths full of pure rain or river water, and the other ingredients added, the whole well shaken together and kept tightly corked. In case of attack the patient should be removed to a shady, cool place, and the head bound with three or four thicknesses of cloth well saturated with the liquid, care being taken to keep it from the eyes. The throat and region of the heart should also be treated in the same way, and the cloths be wet every ten or fifteen minutes. The limbs should be constantly chafed, either by dry rubbing or with aromatic vinegar, and to produce respiration the breast and the stomach be alternately pressed. As soon as the patient can swallow, every ten or fifteen minutes a quarter of a cup of strong tea or coffee, or in default of these, of sugared water, with the addition of a small tea-spoonful of acetate of ammonia, should be given for an adult, and a less quantity of the last to children, say from five to fifteen drops, according to age. This treatment would save many lives.

Teething.—Children often suffer exceedingly during dentition, which is sometimes followed by diarrhea, cholera infantum or Summer complaint, convulsions, and death. The swollen, painful gums, in extreme cases, should be scarified, some soothing syrup given, and the bowels kept open. With proper food on the part of the mother and child, the bowels kept open and regular, cleanliness and good nursing generally, there is no good reason to doubt its safe passage through the period of infancy.

Tetter.—Corrosive sublimate one grain, castor oil one dram, oil of lavender half a dram, alcohol two ounces. This makes a cosmetic lotion of great reputation for the cure of tetter and other skin eruptions; but care should be used in its application, not to let it get into the eyes or mouth. Or, an ounce of puccoon root in a pint of vinegar, taken in small quantities two or three times a day. Or, a solution of chloride of lime and spirits of wine, or some other good article of spirits, used as a wash. Among the ringworm remedies, an excellent one, equally applicable to tetter, may be found.

Tonics.—Many of the root beers combine pleasant beverages and invigorating tonics,

where the ingredients are largely composed of wintergreen, wild-cherry bark, spruce, black birch, hops, sarsaparilla, dandelion roots, yellow parilla, and other roots and herbs. For general debility and chronic weakness, put an ounce of carbonate of iron in a pint of black-berry wine, and take a table-spoonful three times a day before meals. For a good tonic bitters, take a handful each of the roots of Indian hemp, bitter root, milkweed, lady-slipper root, and prickly-ash bark; bruise, and add a pint of boiling water; when cold, bottle and add a pint of good whisky, and an ounce of carbonate of iron, and take half a wine-glassful three times a day.

A celebrated tonic, or elixir of life, the recipe for which was found among the papers of Dr. GUNET, a Swedish physician, who lost his life at the age of one hundred and four years by being thrown from a horse, was thus made: One ounce of Socotrine aloes, and one dram each of zedoary, gentian, best saffron, rhubarb, white agaric, and Venice treacle—reducing to powder and sifting the first six ingredients, put them into a bottle with the treacle, and pour on a pint of brandy; keep cool and moist to prevent fermentation; after eight or ten days, shake the whole well night and morning; next morning pour off carefully, as long as it comes clear, into another bottle; add half a pint of brandy—set it away eight or ten days, when filter again, and so repeat till thoroughly clear. From a tea-spoonful to a table-spoonful is a dose, according to the age or condition of the person, for any special disease; but in health, and with a view to prolong life, seven or eight drops are taken in the morning, and double the quantity at night, in wine, tea, or soup. The secret of its composition remained in Dr. GUNET's family for several generations—all using it daily; his mother attaining the age of one hundred and seven years, his father one hundred and twelve, and his grandfather one hundred and thirty years.

Toothache Remedies.—Creosote is a dangerous remedy, and should not be used, often contracting the muscles of the face. Plunging the feet in cold water often effects a cure. Mix equal quantities of pulverized alum and common salt, placing the mixture on a small piece of wet cotton, so it will adhere, and put it in the hollow tooth. Or, apply pulverized camphor and cayenne pepper on cotton, to the part affected. Or, seven drams of nitrous spirit of ether, and two drams of alum reduced to an impalpable powder, mixed and applied to the

tooth. Or, the extract of tobacco, in a solution of water, rubbed on the face; or take a paper of cut tobacco, pour upon it a wine-glass of warm water; squeeze out part of the moisture, place the pulp upon a slice of bread, and apply it as a plaster to the face. Or, take a lump of unslaked lime the size of a hickory nut, and flake or dissolve it in about two-thirds of a tumbler of water, and hold this lime water in the mouth contiguous to the tooth, repeating it until the pain entirely ceases. A superior article of tooth-ache drops may be thus made: Mix three ounces of alcohol, two ounces each of laudanum, gum camphor, and tincture of cayenne, and one ounce each of tincture of myrrh, oil of cloves, sulphuric ether, and ammonia.

Ulcers.—If inflamed, should be poulticed with slippery-elm bark and water; or, if painful, the slippery elm should be mixed with a decoction of hops, and repeated until the inflammation subsides; then dress with salve. When ulcers are of long standing, irritable, and painful, with a burning sensation, or when they do not show a disposition to heal, or when the edges are covered with a dead white skin or scurf, they should be penciled on the edges every week or ten days with lunar caustic, and then poulticed until the inflammation is overcome, when apply this salve: Three parts beeswax, two of lard, and one each of resin and mutton suet, melted and mixed together. Another ointment for ulcers and tumors is thus compounded: Two ounces of calomel, one ounce of sugar of lead, and half an ounce of red precipitate, well mixed and rubbed together to a very fine powder; then add three to four ounces of melted yellow wax, and six ounces of olive oil; mix and stir till cool. Such are the curative properties of hops, that a strong decoction alone, externally applied, cold, several times a day, powdering the ulcer with finely-pulverized charcoal after each bathing, has repeatedly effected cures of bad ulcers. LONGWORTH'S remedy for scrofula already given, is equally applicable to ulcers.

Urinary Difficulties.—For painfulness, heat or difficulty in discharging urine, or when the urine is too highly colored, make ordinary-sized pills of equal parts of ox gall and finely-pulverized liquorice root, and take one or two every night. Or, steep two ounces of juniper berries, and half an ounce of gum arabic, adding some spirits of niter, and take in small quantities. Or, use a tea made of the root of the common garden parsley, or of the leaves of uva ursi; of either of which from one to

three pints may be drank daily. An infusion or syrup made from the leaves of buchu is also very serviceable in affections of the urinary organs.

The following will be found a very efficacious prescription to alleviate the pain and burning sensation often experienced in voiding the urine: Take balsam copaiba one ounce, sweet spirits of niter one ounce, loaf sugar half an ounce, powdered gum arabic one ounce, laudanum one dram, peppermint water sufficient to make an eight-ounce mixture. A little essence of peppermint may also be added to cover the taste. The dose for an adult is a table-spoonful three times a day.

If the above remedies should fail, take super or bicarbonate of soda, as much as will lie on a five cent piece, four or five times a day, dissolved in a quantity of cold water.

For *incontinence of urine*, add four or five drops of the tincture of Spanish flies to each ounce of the above mixture of copaiba, and take from one to two spoonful of it daily.

Veneral Disease.—In ordinary cases, cure is quite certain by means of strong purifying syrup or decoction of May-apple root, blue-flag root, and poke root; and if any of the following can be added, all the better, namely: *Stillingia*, yellow parilla, burdock, and *corydalis formosa*, commonly called turkey corn or squirrel corn—a handful of each, except somewhat less of the May-apple; boiling several hours slowly in rain water, until reduced to two quarts of strong decoction; strain and add two pounds of white sugar, when boil to dissolve the sugar; when cold, add four drams of iodide of potassa, first dissolving it in two ounces of water. Dose—two or three table-spoonful two or three times a day; if acting too freely on the bowels, reduce the quantity so as to produce not more than two operations daily. If there are ulcers in the throat or mouth, touch them occasionally with caustic, and wash with a strong decoction of white-oak bark, in which has been dissolved some alum and borax; or a wash of a decoction of May-apple, blue flag, and poke roots, with a table-spoonful of powdered borax dissolved in each pint. The body must be kept clean, bathing occasionally in a warm bath in which some saleratus has been dissolved, or lye added. The water-cure treatment advises wet compresses unremittingly applied to the affected parts, frequent use of the wet-pack sheet, and scanty vegetable diet—the hunger-cure being highly recommended.

Vomiting.—To check stomach sickness or vomiting, for an adult, take twenty drops of laudanum, and five drops of the oil of cinnamon on loaf sugar, or in any other manner—repeat in half an hour in severe cases. Or, a bunch of the flowers of the larkspur, or half an ounce of the leaves and flowers steeped in a pint of boiling water, and given in half-teaspoonful doses, at short intervals, or every half hour.

Whooping Cough.—While the disease will run its course, it can be mitigated. Sometimes mild emetics are given, and sometimes opiates to allay the severity of the cough. Simmer together half a tea-cup of lard and a piece of gum camphor as large as one's thumb; rub this ointment on the stomach. Take the gum of asafetida the size of one's thumb, steep in water, half a tea-cupful when done, sweetened with honey or loaf sugar; take from half to a whole tea-spoonful three or four times a day. Or, mix a tea-spoonful of castor oil in a table-spoonful of molasses; take a tea-spoonful whenever the cough is troublesome. Or, place small quantities of the carbonate of lime in saucers in the room where the child sleeps, merely sufficient to make the odor perceptible. The odor is like coal tar, and, if not too strong, is not unpleasant.

Worms in Children.—Peach leaves boiled in milk are an excellent remedy; the apples or knots growing on cedar trees, eaten, will expel worms; honey and milk; a strong decoction of witch-hazel, salt, powdered sage, and molasses, taken frequently; a lump of green copperas half the size of a pea, rubbed and dissolved in about two table-spoonful of sweet milk, on going to bed, are all regarded as useful vermifuges. Or, take half an ounce each of Carolina pink root, Alexandria senna, and manna, bruised and mixed together; add a pint of boiling water, and when cool, sweeten. Dose for a child five years old, given only on an empty stomach, a wine-glassful three times a day in sweet milk. To make worm pills, ethereal extract of malefern, thirty drops; extract of dandelion, one dram, with powdered gum enough to make thirty pills. Dose—from six to twenty, followed by a strong dose of castor oil in half an hour.

The hydropathic treatment for worms is, copious tepid injections, to cleanse out the viscid slimy secretions in which the animals are imbedded, and very plain coarse diet, to remove the condition upon which their existence and development depends. Unfermented wheat-

meal bread, and plenty of good apples, are an example for a perfect dietary system in the case. Relief is obtained by the expulsion of the worms; but like all chronic maladies, a cure is only to be effected by restoring healthy action and secretion.

For *worm fever* in children, steep about three-fourths of an ounce of pink, and one-fourth of an ounce of senna together; sweeten, and give cold to the child during the day, whenever thirsty. At night give a small quantity of calomel, enough to cut up the worms, but not enough to physic; and next morning give enough of calomel and jalap to physic off well, breaking up the fever, and carrying off the worms.

For *tape-worm*, abstain from all food, except to eat the meats of pumpkin-seeds freely, for some thirty hours or more, upon which the worm seems to gorge, letting go its hold on the membrane, and in some measure probably becomes torpid, when a large dose of castor oil is administered, and it is ejected. This has been repeatedly tried with success; and lizards and other small reptiles, taken into the stomach by drinking out of brooks or springs have been expelled in the same manner.

Wounds.—To prevent wounds from mortifying, sprinkle sugar on them; the Turks first wash fresh wounds with wine, and then sprinkle on the sugar. The leaves of the geranium, and also of valerian, bruised and applied to the wound, are very efficacious. The balm of Gilead buds, or marigold flowers, bottled up in rum, make an excellent lotion for fresh cuts or wounds.

Hold a freshly cut wound or bad bruise over a dish of coals, on which are smoking woolen rags saturated with lard or sweet oil, or other grease—enveloping the limb, if convenient, with a blanket, to condense the smoke upon the wound, in a few minutes the bleeding will cease, coagulating the albumen, and promoting the healing. Ulcers and other cutaneous diseases may be advantageously treated in the same way.

The earth treatment, discovered by the Vicar of Fordington, is a new remedy for wounds likely to prove of great utility—the natural remedial agent of dogs and other dumb brutes. At the Pennsylvania Hospital many cases have been successfully treated with a simple application of dry earth, under the direction of Dr. ADDINELL HEWSON, as given in the *New York Tribune*, in March, 1869, a few of which we here append:

At the time of its introduction there was lying in the ward a patient suffering from a very severe compound fracture of the lower leg. The wound was in an unhealthy condition, and its exudations, amounting to a pint in twenty-four hours, were so offensive as to cause a sickening and even dangerous stench, that the excellent ventilation of the ward and the usual disinfectants were hardly able even to mitigate. It occurred to Dr. HEWSON to test the power of dry earth to absorb this odor, as it had that of excrement. The effect was magical. Not only was the offensiveness entirely overcome, but the effect on the character of the wound itself was such as no previous treatment had been able to compass. The suppuration was, within a few days, so reduced that the daily dressing of a single half pint of earth was not even saturated; the edges of the flesh wound lost their inflamed character; the intense pain of the sore was entirely relieved, and a healthy granulation has ensued.

A railroad brakeman whose hand was, a year and a half ago, crushed between the coupling heads of two cars, and who has never been free from pain, and seldom from intense pain; whose hand from the wrist to the knuckles was a festering mass of carious bones and inflamed flesh, and whose system had been so reduced that he could not have survived the amputation which alone can entirely relieve him, is now happy in freedom from pain. His flesh wound has taken on a healthy character, and his strength is fast returning. He even hopes to save his hand, but the long-continued decay of the bone makes this impossible.

Within a few days a woman was brought to the hospital with her neck and a large part of

her body very severely and dangerously burned. That she could escape long weeks of agony was beyond hope. Yet on Monday her eye was clear and calm, and her voice was strong, and when the doctor asked her how she felt, she said she was a great deal better, and that she had no pain.

Last Wednesday an entire breast was removed for cancer, and the wound was dressed with dry earth. It is now healing rapidly. There has been no inflammation and no suppuration, and this woman too—calm and happy-looking, with a healthy color and a steady voice—spoke far more than her cheerful words in thankfulness for her relief.

The earth used is carefully selected, dried, and pulverized. GEORGE E. WARING, Jr., of the Earth Closet Company, of New York city, recently communicated the following practical directions on this subject:

It is too early in the course of the experiments to speak very positively on the matter, but the following may be considered as established:

1. The earth should contain as little sand and organic matter as possible—probably *pure clay* is the best.

2. It should be thoroughly dry and finely pulverized.

3. It should be applied *directly to the wound or sore*, without the intervention of cloth or lint, save where there is danger that the earth may "burrow," as in deep sores—in these cases a little lint or a bit of folded linen should be put in the bottom of the wound.

4. The earth should be washed off daily with a gentle stream of tepid water, accompanied, when necessary, with a light sponging.

THE CREAM OF FACTS:

SCIENCE, INVENTION, CURIOUS STATISTICS, AND VALUABLE BITS OF KNOWLEDGE.

Romance of Modern Science.—

The old alchemists wasted their lives in the pursuit of two unattainable objects—the philosopher's stone and the elixir of life; the former to turn all metals into gold, and the latter to bestow perpetual youth. It is now known that the turning of all metals into gold would have greatly diminished, instead of augmenting, the wealth of mankind; for if gold were made so abundant it would no longer answer the purpose of money, and for use in the arts it is less valuable than iron. It may be that men will sometimes be brought to the belief that unfading youth would be no blessing, though BULWER makes it very fascinating in the rejuvenated LOUIS GRAYLE.

Modern Science does not expend its efforts in the pursuit of these chimeras; but while it is familiar with marvels of which the ancient alchemists could form no conception, its own future is not wholly unadorned with the dreams of romance. Had some superior intelligence appeared to one of the long-bearded Arabs, among his retorts and crucibles, and prophesied the achievements which the human race were destined to make within a few hundred years, how utterly incredible would have been the prophecy!

Looking down the future, he would have said: "It shall be ascertained that Arabia, Egypt, all sea and land, are not at rest, but are constantly rushing away toward the East more swiftly than the flight of an arrow from a bow. The earth is spherical and swings through space at the rate of a thousand miles a minute. The distance from us to the sun is so great that a horse running twenty miles an hour, without rest day or night, would require more than five hundred years to make the journey, and yet this distance shall be measured with a rod and line. Though this fiery orb is as large as one million four hundred thousand globes the size of this earth, man shall measure its mighty

span. He shall weigh its vast mass with a balance, and the sum of its tons shall be told! He shall learn from God's infallible Scripture, written in the rock, that the earth was spoken into being ages on ages before ADAM. He shall weigh and measure planets that he has never seen. Hidden from the eyes of all who have ever lived, deep sunk in the depths of space, he shall discern and map myriads of other suns, and shall approximately compute the inconceivable distances that separate them from us. Swarming in the dust beneath our feet, in the air we breathe, in the interior of our own bodies, in every stagnant pool, he shall discover multitudes of living beings, of strange and curious structure, whose numbers cast those of the visible inhabitants of the earth into insignificance. He shall render iron as incorruptible as gold. He shall harness impalpable vapor to chariot wheels; he shall make it dig his mines, grind his corn, saw his wood, weave his clothes, and drive his ponderous iron ships over seas to continents now undiscovered. At his easy command the rent rock shall leave its bed and fly headlong through the air. He shall lay his hand upon the solid mountains and they shall yawn open to his passage; he shall be borne through them in ease and comfort, with a velocity surpassing the fleetest steed. The sunbeam shall become his faithful limner, and the thunderbolt the obedient servant of his will; in silence it shall glide swiftly forth, bearing his messages of business, of pleasure, or of caprice, to the uttermost parts of the earth, over Alps and under oceans, passing the sun in his race, and returning in the twinkling of an eye!"

A Dream of the Future.—The modern student of science, to whom these incredible marvels are accomplished and familiar facts, seems less hopeful of continued triumphs than were the ancient alchemists; but there are

some ardent imaginations that love to sweep forward and revel in dreams of the future power of our race—though the wildest flights of the most fertile fancy are tame when compared with the achievements of the past.

These minds conceive that man's power of transporting his body from one place to another has by no means reached its ultimate limit; that he will not only move more swiftly over the earth, by means of pneumatic or other power, as yet undeveloped, but that he will sail through the air at will, and sweep under the sea. In their view, as the coal fields fail, man will bore through the earth's thin crust, and warm himself with a hot-air supply from the internal fires; or, chemistry may render water more cheaply inflammable, until every well and stream shall furnish warmth and illumination.

In their view, express companies will send their packages over the earth in exhausted air-tubes; shooting the charges across continents and under seas, to New York, London, Peking, in an hour, as we send our invisible word upon a wire.

In their view, man will ultimately circumvent famine, by learning how to create food from the inorganic elements; so that, instead of "driving nature into a corner," by THOREAU's heroic practice, or being crushed by the earthly necessity of daily bread, as millions are, every civilized being will have a patent retort at his elbow, and will appease his hunger from time to time by turning a crank, and combining carbon, oxygen, and the salts in succulent and appetizing forms of human nutriment.

The auxiliaries of industry will continue to be multiplied, till all are able to command leisure, and thus to secure mental cultivation. The vast mysteries of psychology will be revealed, and a universal alphabet will be adopted as the phonetic solvent of all languages, to abolish clumsy orthographies and to straighten and shorten the road to knowledge. With the removal of ignorance and the temptations of poverty, degradation, vice, and crime shall cease, and oppression and war shall come to an end; and intelligence, comfort, prosperity, virtue, peace, happiness, shall be the common inheritance of all. Higher still! As the decay of old age is caused by the gradual accumulations of solid deposits in the system, and as there are known methods of dissolving these deposits, some of the boldest imaginations behold the future radiant with the brightest of all hopes—the promise and assurance of perpetual

youth! As this would be a doubtful blessing, its fulfillment will probably be deferred—but are the other anticipations too extravagant to be realized? And, perhaps discoveries in the realm of spiritual things will be even greater than these!

"Some Mocked."—Almost every great invention, discovery, and reform has had to encounter not only the sneers of the ignorant and the denunciations of the conservative, but the persecution of religious bigots. These last retarded the progress of geology, of chemistry, of astronomy, of philosophy, and of all the physical sciences; it is only within the present century that, under a wiser ministry, the Church has come to accept the demonstrations of the learned, as to the structure of the material universe.

Propagandists of new doctrines respecting the earth have generally been branded as infidels. The distinguished TYCHO BRAHE proved from Joshua that the sun revolved around the earth. COPERNICUS was so intimidated by the bigots of his time that he dared not publish his theory of a spherical universe until he was certain that he was on his death bed. GALILEO was persecuted in the dungeons of Rome for disseminating the same doctrine, which was declared to be "contrary to the Bible;" and BRUNO was hunted from kingdom to kingdom, by Catholics and Protestants alike, and was finally burned at the stake for his "heresies."

Doctor FAUST was derided and driven from place to place by the German monks, on the ground that "his partner, the devil" had invented for him the art of printing. Doctor FRANKLIN was charged with sacrilege for his temerity in tempting lightning from Heaven, and the inventors of lightning-rods were denounced for harboring the blasphemous purpose of thwarting the will of "an angry God."

STUART MILL exclaims, while deprecating the backward-looking tendencies of those who are intolerant of moral progress: "There have been abundance of people in all ages of Christianity, who tried to make it something like Islamism or Braminism; to convert us into a sort of Christian Mussulmans with the Bible for a Koran, prohibiting all improvement; and great has been their power, and many have had to sacrifice their lives in resisting them. But they have been resisted, and the resistance has made us what we are, and will yet make us what we are to be."^{*}

^{*}The Subjection of Woman, p. 85.

"The Good Old Times."—There are, in every community, a few morbid sentimentalists who wag their heads wisely and lament that the world is rushing to ruin, and talk about what they call "the good old times." In fact, however, history tells us that, not only is the average of human intelligence and comfort much higher than in any other age of the world, but vice and crime are less prevalent than ever before.

King SOLOMON is said to have been "gorgeously attired," but this was only as compared with the half-nude people of his time. Moreover, this was the language of oriental extravagance; and when we remember that his wardrobe, like his table, must have consisted of a few of the coarsest things only, we can make considerable allowance for the magnificence of the display.

Articles that were unknown to JULIUS CÆSAR, and were costly luxuries to CHARLES the First, even, are now things of commonest necessity. Norman WILLIAM came into Britain without a hat—for that article of apparel had not then been devised. Spectacles had not then been constructed, and it was still two centuries before the mariner's compass, and four centuries prior to the birth of printing.

Three hundred years ago—that is, when our great grandfather's great grandfather was born—carpets were utterly unknown. The walls even of princely palaces were rough and unplastered, though sometimes abundantly hung with the tapestry which spiders weave. The floors were covered with rushes, which were swept out every few months, and fresh ones scattered in their places. Dogs and cats were allowed free access to the eating rooms, and the fragments and bones were thrown to them. They ate till they were satisfied, and the remainder was permitted to decay under foot.

The drainings of the beer vessels and all manner of refuse was thrown out upon these rushes, and the dining halls were, of course, too untidy for a modern menagerie. There was no window glass, even in the mansions of the nobility, and there was no way to exclude the cold without excluding the light also. To enjoy a beautiful landscape involved exposure to the weather, in all parts of Great Britain and America, even as late as one hundred and fifty years ago.

A Roman senator who, in the Empire's palmy days, possessed estates in Naples and Britain from which he drew an income that would be equivalent to a royal revenue in this day, had

neither glass to his windows nor a shirt to his back, and when he rode in his coach of solid gold, without spring or covering, might envy our laborer who goes out to his work in a railroad car. An Earl of Northumberland in 1600 breakfasted off of wooden trenchers and dined in state off of pewter, and when he was absent from alnwick castle the glass was taken out of the windows and laid up in safety. Not a cabbage, carrot, turnip, or other edible root grew in England during the early part of the reign of HENRY VIII, and from the scarcity of fodder, fresh meat was only obtainable during the Summer, salted hog's flesh being generally used by all classes the rest of the year. Queen ELIZABETH's breakfast used to consist chiefly in strong ale and salt beef, and the same dainties were served up for her supper after she had retired to bed.

In fact, it is probable that, before the seventeenth century, no king of any country in the world lived as comfortable and well as the average of American laborers live to-day.

Canals.—Canal locks were invented in 1581, by engineers of Viterbo, in Italy. They were nearly a hundred years getting fairly into use in France, and about a hundred and fifty in crossing the British channel. At this time it was made a felony in several European States to ride in wheel carriages.

When, about 1760, PETER the Great commenced a canal between the Volga and the Don, the governors and other dignitaries of the country opposed it earnestly, declaring it "impiety" to turn rivers out of the channels which Heaven assigned them! When some Dutchman proposed to make the river Manzanares navigable to the Tagus, and that to Lisbon, the Portuguese Council declined to permit the sacrilege, and rebuked him, saying, "If it had been the will of God that the river should be navigable, he would have made it so!"

When BRINDLEY, the great engineer, told a committee of Parliament, to whom BRIDGE-WATER's petition was referred, that canals were better than rivers and would largely supersede them, the committee were shocked, and asked him, "And pray, sir, what do you suppose God made the rivers for?" "To feed the canals," he calmly answered.

Steamboats and Railroads.—It is only within the present century that steam has been of much practical utility as a propelling

power; yet **HERO** of Alexandria, more than two thousand years ago, constructed a toy steam engine, by throwing jets of steam upon paddle-wheels. It was not till the beginning of the seventeenth century that **DE CAMES** proposed to apply the elastic property of steam as a power, and fifty years more passed before the Marquis of Worcester projected a high-pressure steam engine. Toward the close of the century, **PAPIN** discovered a method of producing a vacuum by the condensation of steam, and Captain **SAVARY** suggested the application of steam to navigation, and invented the first working steam engine.

In 1736, **JONATHAN HULLS**, also an Englishman, took out a patent for a steamboat (tug), and published an illustrated description of it, entitled, "A description and draught of a new-invented machine for carrying vessels or ships out of or into any harbor, port, or river, against wind and tide." He proposed to employ one of **NEWCOMEN'S** rude engines, in which the piston was drawn up by a weight. The boat was to be propelled by a paddle-wheel at the stern. The plan being received with great derision, the boat was never made. But the conception entitles him to immortal honor.

About 1750, **WATT** applied himself to improvements in the steam engine, and his success was so marked, that his inventions gave a new stimulus to the project of propelling boats and carriages by steam. The French claim for the Marquis **DE JOUFFROY** the honor of having been the first who successfully applied steam power to propel boats, in 1772—when **FULTON** was an infant. His boat was 145 feet long.

In 1785, **JAMES RUMSEY**, of Virginia, published his plan for "propelling boats against the stream;" but it was to be by a mechanical contrivance other than steam. Two years later, he had got from **JOHN FITCH**, of Connecticut, the idea of steam, and with it pumped water through a boat, propelling it at the rate of three miles an hour against the current of the Potomac river.

FITCH had already been working energetically for two years, trying to get money enough to make a steamboat, and had won a wide reputation as a lunatic. At last, in October, 1788, his boat was finished. It was worked by oars, moved by a steam engine, having a twelve-inch cylinder and a three-foot piston—the product of **FITCH'S** own genius and the work of his own hand. A mile was measured in the Delaware off Water street, Philadelphia, and, amid great excitement, the *Perseverance*, **FITCH'S** queer

boat, ran the distance in dead water in seven minutes and a half, at the rate of eight miles an hour! This was practically the birth of steam-boating. On the 12th of October she ascended the Delaware twenty miles in three hours and twenty minutes, with thirty passengers on board; after which trip she ran as a passenger boat for some time on the river. After being used a year she took fire and burned to the water's edge.

In 1788, also, an experiment was tried by **JAMES TAYLOR** on Dalswinton Lake, Scotland, and he propelled his boat at the rate, first of five, then of seven miles an hour. Lord **DUNDAS** made a more perfect steamboat, on Taylor's plan, and tried it on the Forth and Clyde canal, towing two vessels, each seventy tons burden, twenty miles in six hours.

In the Spring of 1789 a second boat was built for **FITCH**, and, in 1790, a third, by a corporate company of business men of Philadelphia. During a severe storm, the boats were driven upon **PETTY'S** island, and the enterprise was abandoned. But **FITCH** had already fairly earned the credit of being the original inventor of steamboats, twenty years before **FULTON** appeared upon the Hudson.

And he was not yet the victim of that despair which afterward terminated his life. He proceeded to France, failed to obtain the assistance denied him at home, worked his passage back to New York city as a common sailor, and there, in 1796, on Collect Pond, where now frowns the Tombs, he built another boat, propelled by a stern-screw, which was operated by steam. Several witnesses declare that it was a perfect success. The boat was a common yawl; the boiler a twelve-gallon pot, with a lid of thick plank. **JOHN HUTCHINGS**, then a lad, employed to steer **FITCH'S** boat, declares that **LIVINGSTON** and **FULTON** frequently visited the boat and rode around the pond.

As early as 1800, **COLLINS' History of Kentucky** says in 1794, one **EDWARD WEST** tried an experiment with an oar-boat moved by steam, upon the Elkhorn at Lexington, which "moved through the water with great velocity." But the results of this success were evanescent.

It was reserved for **ROBERT FULTON** to reap the glory and fame of these tireless and disappointed inventors. Much honor is due to him; not for the invention of a steamboat, but for the permanent establishment of navigation by steam. After watching **FITCH'S** propeller, he visited the scene of **TAYLOR'S** experiment in Scotland, examined the *Charlotte Dundas*,

studied the progress of the invention in France, then returned to New York city and placed himself under the distinguished patronage of ROBERT R. LIVINGSTON, whom he had met in France and had succeeded in interesting in the dawning invention. They procured from England an engine made by WATT, of twenty-horse power, and, in 1807, the *Clermont*, one hundred and thirty-three feet long, was launched into the Hudson.

The crowds that assembled along the wharves, most of them ignorant of FITCH's success twenty years before, were unanimous in their incredulity, and about equally divided between derision and sympathy for "the visionary." An accident delayed him, but after repairing a fracture in the machinery, the boat steamed up the river to the astonishment of the multitudes of doubters, and made its way persistently toward Albany against wind and tide, exciting a tumult along the shore and creating consternation on the wind-bound sloops, as it churned the water into foam and vomited fire along its path. The success of the trip completely upset the *a priori* reasoners and revolutionized commerce.

It is true that FULTON had only made four or five miles an hour, while FITCH, twenty years before had made seven to eight, and that FULTON's trip was experimental while FITCH had run a passenger steamboat for many months; yet, the achievements of the two men, in the eyes of the world, were as different as failure and success. For FITCH was a penniless adventurer who, a captive in the Revolution, had been bartered for tobacco between Indian tribes, while FULTON was an accomplished engineer, and was backed by one of the most famous and wealthy of the Cavaliers. And, what seemed still more to the purpose, FITCH's Delaware river boats had all been given to fire or wreck, his propeller of Collect Pond had been carried to their bleak rookeries, piece by piece, by the shivering children of the Five Points, and he, himself, disgusted with the world's stupidity, had died of drink in the wilderness of Kentucky.

A few days after FULTON's great trial-trip, R. L. STEVENS, of Hoboken, New Jersey, made even a more successful effort, and was the first to put to sea in a steamboat, taking his craft to Delaware. He introduced many important improvements. From this time, the permanency of steam navigation was assured and its progress was rapid. HENRY BELL, of Glasgow, launched his *Comet* in 1811, and it made nine

miles an hour; and from England steamboating was introduced to Europe.

Railways.—In the meantime, railroads were coming into use. Indeed, railways were constructed two hundred years before steam locomotives were known, the tramways being formed first of wood, then of iron, to diminish the friction of wagon-wheels, in drawing coal from the mines with horses. Cast-iron rails were first used in 1767. The stationary steam engine was substituted for horses in 1808, limiting its service to drawing the cars up heavy grades by ropes extending from its fixed position at the top of the hill.

Steam carriages for common roads had already been devised, and scores of Englishmen had wasted their fortunes in efforts to perfect the chimerical scheme. The plan was even tried, in 1830, an expensive carriage, steam-propelled, plying for several weeks through a street of London.

In 1825, GEORGE STEPHENSON introduced steam as a motive power on a coal railway in England, making eight miles an hour. The result astonished the realm; and there was a wide demand for steam railways. STEPHENSON promised to run a train twenty miles in an hour. At this NICHOLAS WOOD published a book to illustrate the benefits to be derived from railways, but deprecated the extravagant anticipations that were extant. He was confident that he had measured the maximum power of the locomotive, and he adds "nothing can do more harm toward the adoption of railways than the promulgation of such nonsense as that we shall see locomotive engines traveling at the rate of twelve, sixteen, eighteen, and twenty miles an hour!"

In September 1830, scarcely forty years ago, was the formal opening of the first steam passenger railway, between Liverpool and Manchester, England. STEPHENSON built the first locomotive, "The Rocket," which drew a train over the rails at the creditable speed of thirty miles an hour. From that day railroad enterprises have assured rapid transit through every civilized country.

In 1826, the Albany and Schenectady railroad company was incorporated—capital \$300,000. In August, 1830, a double-track road was begun—one month before STEPHENSON's famous success. The company intended to use horses as a propelling power; indeed, horses were used for some months. But the locomotive was soon substituted, and in October, 1831, the number of passengers averaged three hun-

dred and eighty-seven per day. This was the first steam railway in America; and the old silhouette of the first train of stage-coaches on high wheels, is as quaint as can well be imagined. There are now (1869) more than forty-five thousand miles in operation in this country. Some trains have attained the enormous speed of seventy miles an hour—one-tenth the speed of a cannon-ball.

A Boy Inventor.—In the early atmospheric engines, the cocks by which the steam was admitted and condensed, and by which the injected and condensed steam was drawn off, were worked by hand; and as the labor was light and monotonous, and required no skill, boys were employed for the purpose, called "cock-boys." It happened that a cock-boy, by name POTTER, having an itch for play, and endowed with more ingenuity than industry, imagined that by tying strings to the cocks, and connecting them with the working-beam above the cylinders, regulating the action by carrying them over and under certain pipes, he could make the beam, as it ascended and descended, open and close the cocks more regularly and effectually than he found himself able to do. This he accordingly accomplished, and was habitually absent from the engine-house, enjoying himself with his playfellows, when his employers were giving him credit for most extraordinary vigilance and regularity in the discharge of his duties. The engine, in fact, by this expedient, nearly tripled its efficacy. Thus, by the ingenuity of a child, the steam engine was first endowed with those qualities of an automaton which have ever since rendered it an object of interest and admiration.

The Magnetic Telegraph.—Is there anything new under the sun? The magnetic telegraph was foreshadowed by the poets and seers of the earliest times; not only in a vague and general way, but occasionally with curious definiteness. The Jesuits of the sixteenth century were the legitimate successors of the magicians of the middle ages. One of these, STRADA, an Italian, nearly three hundred years ago, wrote of sympathetic magnetic needles, by which distant friends were able to converse; though it is certain that the idea was only fanciful. KIRCHER, a learned German Jesuit, is said to have achieved, half a century later, the transfer of written letters from one place to another by electricity. He tried to explain the method pursued, in his

Prælectiones Magneticæ. An encyclopedia, published before the invention, or revival, of the magnetic telegraph, says: "His writings exhibit great learning, but are *disfigured by many extravagances.*"

The plan of making communications by signals on hills has been in operation from time immemorial; first, by beacon-lights, and second, more effectually by tall posts with movable arms. Both were called telegraphs or semaphores. Telegraphing is still carried on, in a fleet at sea, by means of flags.

Dr. WATSON, of England, discovered in 1747, that the charge of a Leyden jar could be sent instantaneously through a circuit of four miles; when the possibility of conveying messages by electricity became a subject of conjecture. In 1774, M. LESAGE, of Geneva, Switzerland, proposed to transmit messages by means of electricity generated by friction, causing it to move pendant pith-balls at the remote terminus.

It is well known that when two pith-balls are suspended from a wire that forms part of an electric current, the electricity communicated to the balls causes them to swing apart, while the wire is charged. Signals obtained in this way were very simple, and only two circumstances prevented the success of the invention, viz.: That electricity generated by an excited glass rod was too feeble to be effective at long distances, and that it was deemed necessary to have twenty-four insulated wires running all the way! The voltaic battery was not then known; and nobody seems to have thought of indicating all the letters of the alphabet through one wire, by having one divergence of the balls signify A, two prolonged ones B, two short ones C, etc., on the principle which now controls the telegraph.

The discovery of the battery by VOLTA, at the beginning of this century, was a most important step, and the battery was applied to telegraphing by Mr. SOEMMERING in 1809, his signals consisting in bubbles of gas arising from decomposed water. But the number of wires used constituted a fatal impediment. Seven years later, Mr. RONALDS perfected the apparatus, dispensing with all the wires except one, and successfully conveying messages through eight miles of wire. He asked the English government to adopt it for its use, and received a tardy reply that "telegraphs are of no use in time of peace, and during war the semaphore answers all the required purposes!" This disheartened the inventor, and he abandoned the telegraph to its fate.

In 1818, Professor CÆSTED, a European, discovered the magnetic property of the electric current; and in 1832, SCHWEIGER invented the recording electric telegraph, and about the same time Professor S. F. B. MORSE, of New York University, invented and constructed the first practical telegraph, in principle the same as that used at the present day. About the same time, or a little later, Professor WHEATSTONE, in England, and Mr. ALEXANDER, in Scotland, constructed electric telegraphs.

Mr. MORSE's telegraph is the one generally used in this country, and on the European continent; one chief point of superiority consisting in the simplicity of its alphabet. The symbols consist in a repetition of long and short strokes along a straight line; thus, a stroke followed by a dot signifies A; a stroke preceded by a dot, B; a single dot, E, etc. The mechanism of this telegraph was mainly invented by ALFRED VAIL, of Morristown, New Jersey, and may be easily described. The transmitter is merely a spring key, like that of a musical instrument, which on being pressed down makes contact with the voltaic battery, and sends an electric current to the receiving station. The operator thus brings into action an electromagnet at the station he communicates with, and that pulls down a point fixed to the iron lever, upon a strip of soft paper that is kept moving slowly under it. The duration of the pressure on the key thus occasions the difference in the length of the lines indented on the paper.

Since this invention became generally adopted, Mr. BAIN in England, and Mr. HOUSE in this country, have constructed telegraphs which print their own messages; and more recently FREDERICK C. BAKEWELL has devised an invention for sending exact copies of handwriting to avoid errors. As a special means of secrecy, the messages may be received on paper moistened with a solution of nitrate of soda, and remain invisible until brushed over with a solution of prussiate of potash, applied by the person to whom the communication is addressed.

Every enlightened country is now covered over with a net-work of telegraphic wires; rates of transmission are being every year reduced; and we may anticipate the time when the telegraph will, in a very great measure, supersede the mails.

Velocity of Electricity.—Experiments which have been made over the telegraph lines between Harvard College and San Francisco, show that the time required by electricity to travel

from place to place is as follows: From Boston to Buffalo and back, one-tenth of a second; to Chicago and back, one-fifth of a second; to Omaha and back, one-third of a second; to Salt Lake and back, one-half of a second; to San Francisco and back, about three-quarters of a second.

Photography.—The photographic process seems to be the only one of the wonderful modern inventions that were not, centuries ago, anticipated or foreshadowed in song and prophecy. The thought of making nature her own limner was too audacious, and the result too astounding to be conceived of. The first step toward photography was the invention of the camera obscura; generating a desire to fix and transfer its beautiful pictures.

About the middle of the sixteenth century, the alchemists detected the influence of light in darkening the salts of silver—and on this phenomenon all photographic processes depend. The influence of the solar ray in facilitating the crystallization of saltpeter and sal-ammoniac was shown by PETIT, in 1722; and fifty years later, SCHEELÉ, in an analysis to extract fire, which he erroneously supposed to be a simple chemical element, discovered that the violet rays of the spectrum possessed great power in influencing the nitrate of silver—then called "the acid of silver." Thus, from error, was a great truth evolved. From alchemy came chemistry.

A quarter of a century later, at the beginning of the present century, Mr. WEDGWOOD, a porcelain manufacturer, and Mr. (afterward Sir) HUMPHREY DAVY, first succeeded in impressing the images of the camera on the screen, but the retention was transient—the paper becoming black when exposed for a short time to the light. WEDGWOOD and DAVY both published in 1802, "an account of making profiles by the agency of light" Had they understood the effect of the compound salt, hyposulphite of soda, in rendering the paper insensible to the further impressions of light, they would doubtless have perfected photography. As it was, their failure discouraged others, and the great discovery had to wait.

M. NIEPCE, of France, began experiments in 1814, and was the first to obtain *permanent* impressions of the camera. In 1829, he explained his process to M. DAGUERRE, and they pursued their investigations jointly. Within the next ten years NIEPCE died, and DAGUERRE produced the beautiful daguerreotype.

The process finally adopted by DAGUERRE was to deposit a film of iodine on a highly-polished silver plate, by exposing the plate to the vapor of iodine in a dark box. The prepared plate was then placed in the camera, and after an exposure to the light of ten minutes or more, an impression was made on the iodized silver, but too faint to be visible. To bring out the image, the plate was exposed to the vapor of mercury, in a closed box. The mercury adhered to the parts on which the light had acted, and left the other parts of the plate untouched; and so a beautiful representation was produced. The iodized silver remaining on the plate, was washed off by a solution of hyposulphite of soda, and the picture was exposed without injury.

The process by which the images of the camera can be fixed on paper, was discovered by Mr. FOX TALBOT, of England, in 1840; and at a later day, he was the first to impress and fix images on glass and steel.

The Stereoscope.—This is one of the most beautiful pictorial illusions ever effected. Its principle depends on the different appearance which a near object presents when seen by the right eye or by the left. For instance, on looking with the right eye only, at a book placed edgewise before the face, the back and one side of the book will be perceived; and on closing the right eye and opening the left, the back and the other side of the book alone will be visible. It is the blending of both these views, by the delicate and mysterious sense of vision, that produces the impression of solidity and distance. So, if the different appearances which the book presents to each eye be copied in separate drawings, and then be so fixed that the right view only can be seen with the right eye and the left view with the left, the two images will combine on the retina of the eye, and the compound picture will, in size, distance, and perspective, seem to be the very book itself.

Professor WHEATSTONE, of England, was the first who contrived, in 1838, an instrument to illustrate this effect of binocular vision, and he also claims to be the first who brought to notice the different appearances of an object seen with each eye separately. In fact, however, the difference of vision was noticed by LEONARDO DA VINCI in 1500, and more carefully by GALEN in 1700. But Prof. WHEATSTONE first rendered this knowledge practical by the invention and construction of the first

stereoscope—made on the principle and somewhat in the shape of those of the present day.

It is generally supposed that the two pictures of a stereoscopic view are precisely alike—duplicates. A careful examination of any good view will, however, show the error of this supposition; the perspective in the two pictures is perceptibly different, if they have been correctly taken; the right-hand view being taken from the standpoint of the right eye, and the other from that of the left eye. This difference will be most palpable in a landscape, or some vista where distance intervenes between the objects in the foreground and those of the background—the foreground of the right-hand picture being relatively farther to the left.

A stereoscopic picture can not be obtained by photographing a painting, or any flat surface, from *any* two points of vision; there must be articles in relief. These views are best taken with a double camera, occupying the position of the two eyes, and thus obtaining two slightly different pictures from the required angle at the same instant. Portraits thus taken are far more desirable than photographs; for with the assistance of the little toy, the stereoscope, they not only retain the lineaments of a friend, but assure the appearance of his living presence forever.

Matches.—According to PLINY fire was a long time unknown to the ancient Egyptians, and when EUDOXUS (the celebrated astronomer) showed it them, they were absolutely in rapture. The Persians, Phœnicians, Greeks, and several other nations, acknowledged that their ancestors were once without the use of fire; and the Chinese confess the same of their progenitors. POMPEIAN, MOLA, PLUTARCH, and other ancients, speak of nations who, at the time they wrote, knew not the use of fire, or had just learned it. Facts of the same kind are also attested by several modern nations. The inhabitants of the Marian Islands, which were discovered in 1551, had no idea of fire. Never was astonishment greater than theirs when they saw it on the desert of Magellan, in one of their islands. At first they believed it was some kind of an animal that fixed to and fed upon wood. The inhabitants of the Philippine and Canary Islands were formerly equally ignorant. Africa presents, even in our own day, nations in this deplorable state.

The inventor of lucifer matches has done more for the comfort of mankind than the inventor of the telegraph. The present genera-

tion of youths can scarcely comprehend the indescribable relief matches have brought to civilized man; it is difficult to measure the contrast between the minute splinter holding in reserve instantaneous fire, and the clumsy flint, steel, and tinder that seem to us to have been discarded five centuries ago, but which, in fact, bent the backs and tried the skill and exhausted the patience of our own fathers and mothers as late as 1830.

Not only is the match conducive to comfort and economy in every way, but it is also a missionary of good morals, for domestic profanity has probably diminished one-half since the abolition of that prolific cause, the provoking tinder-box.

It was a regular household care fifty years ago to provide enough tinder—scorched linen, or dried punk—to protect it from moisture, and have at hand a piece of steel and a flint “with fire in it.” Even when thus fully equipped, the striking of a light was no mean accomplishment, and the unskillful hand, operating in the dark, would generally get no available sparks, and skin the knuckles besides. The despairing performer would occasionally sprinkle powder on the tinder, sometimes with disastrous consequences.

Finally, the tinder-box was partially superseded by matches pointed with brimstone, which would ignite on dipping into a phial of liquid phosphorus. This arrangement was expensive and dangerous, and did not become popular. Another invention was the use of a mixture of chlorate of potass and sugar, brought in contact with sulphuric acid—an explosive flame resulting. This, for similar reasons, was not received with much favor.

The first friction match of which we have any account, was invented by JOHN WALKER, an English chemist, in 1829, and Prof. FARADAY urged and secured its general introduction. This was a thin splinter of dry wood, tipped with a mixture of one-fourth chlorate of potass, one-half sulphide of antimony, and one-fourth gum. Its ignition was secured (sometimes) by drawing it briskly through sandpaper.

The next candidate, the Congreve match, completely supplanted the flint and steel. The matches first tipped with sulphur, were dipped in a mixture of phosphorus and chlorate of potass, and ignited by being rubbed on end, like the present lucifers. In the invention of friction matches, as in many other things, science owes a debt to quackery; for phosphorus was discovered in 1669, by BRANDT, a German

alchemist, engaged in researches on the philosopher's stone, or the art of converting common metals into gold. Great progress has recently been made, until we have a variety of matches difficult to improve upon, and tens of thousands of persons are engaged in their manufacture.

Inoculation.—In 1721, Doctor ZABDIEL BOYLSTON, of Boston, during the ravages of the small-pox, introduced inoculation, as practiced by the physicians of Asia. It was not yet known in Europe, but BOYLSTON fearlessly inoculated his own son, and two of his servants, and the result being successful, began to extend the practice. The innovation was received with universal opposition, but he persisted against the popular clamor and an ordinance of the city council, until two hundred and forty-seven persons had passed under his hands. The tumult increased. A riot was imminent. His opponents maintained that he was spreading contagion wilfully; for, as the plague was a judgment from God on the sins of the people, all attempts to avert it would but provoke Him the more; that, as there was a time appointed to every man for death, it was impious to attempt to stay or to avert the stroke. Religious bigotry so exasperated the ignorant against BOYLSTON, that attempts were made to take his life, and he was compelled to hide in his house to escape their fury. He lived, however, to see inoculation generally introduced into Massachusetts many years before it was practiced in England. In 1776, Doctor JENNER introduced vaccination for kine-pox, which had been discovered by the dairy servants of Gloucestershire. This soon superseded the old inoculation.

Philosophical Facts.—Mercury freezes at thirty-eight degrees below Fahrenheit, and becomes a solid mass malleable under the hammer.

The greatest height at which visible clouds ever exist does not exceed ten miles.

Air is about eight hundred and fifteen times lighter than water.

The pressure of the atmosphere upon every square foot of the earth amounts to two thousand one hundred and sixty pounds. An ordinary sized man, supposing his surface to be fourteen square feet, sustains the enormous pressure of thirty thousand two hundred and forty pounds.

Heat rarefies the air to such an extent that it may be made to occupy five or six hundred times the space it did before.

The barometer falls one-tenth of an inch for every seventy-eight feet of elevation.

The violence of the expansion of water when freezing is sufficient to cleave a globe of copper of such thickness as to require a force of 27,000 pounds, to produce the same effect.

During the conversion of ice into water one hundred and forty degrees of heat are absorbed.

Water, when converted into steam, increases in bulk eighteen hundred times.

One hundred pounds of water of the Dead Sea contains forty-five pounds of salt.

The mean annual depth of rain that falls at the equator is ninety-six inches.

Portions of the Atlantic Ocean have been sounded to the depth of eight miles—a distance much greater than the altitude of the highest mountain, Everest, in Asia, which is five and a half miles.

Assuming the temperature of the interior of the earth to increase uniformly as we descend at the rate of one degree in forty-six feet, at the depth of sixty miles it will amount to 480,000 degrees of Fahrenheit—a degree of heat sufficient to fuse all known substances.

Hailstones sometimes fall with a velocity of one hundred and thirteen feet in a second—rain thirty-four feet in a second.

The greatest artificial cold ever produced is ninety-two degrees below zero.

Thunder can be heard at the distance of thirty miles.

Lightning can be seen by reflection at the distance of two hundred miles.

The explosive force of closely confined gunpowder is six and a half tons to the square inch.

Sound travels at the rate of one thousand one hundred and forty-two feet per second—about thirteen miles in a minute. So that if we hear a clap of thunder half a minute after the flash, we may calculate that the discharge of electricity is six and a half miles off.

In one second of time—in one beat of the pendulum of a clock, light travels two hundred thousand miles. Were a cannon-ball shot toward the sun, and were it to maintain full speed, it would be twenty years in reaching it—and yet light travels through this space in seven or eight minutes.

A body projected from the surface of the moon, with a velocity of about 7,700 feet per second, would be detached from that satellite and brought to the earth by terrestrial gravitation.

In silver-wire gilt, the coating of the gold is

usually only the 3,384,000th part of an inch in thickness; nevertheless it is so perfect as not to exhibit cracks when examined by the microscope.

Strange as it may appear, a ball of a ton weight and another of the same material of an ounce weight falling from any height will reach the ground at the same time.

BUFFON combined plane glass mirrors only 6 inches by 8, and with 40 of them he set on fire a tarred oak plank 66 feet distant; with 98, at 126 feet; with 112, at 138 feet; with 154, at 150 feet; with 168, at 200 feet; and he melted all the metals at from 30 to 40 feet distant. There are a thousand wonderful things in science which have never yet been discovered—let the world keep up the research.

The heat does not increase as we rise above the earth nearer to the sun, but decreases rapidly until, beyond the regions of the atmosphere, in void, it is estimated that the cold is about seventy degrees below zero. The line of perpetual frost at the equator is 15,000 feet altitude; at 13,000 feet between the tropics; and 9,000 to 4,000 feet between the latitudes of forty degrees and fifty-nine degrees.

At a depth of forty-five feet under ground, the temperature of the earth is uniform throughout the year.

In Summer time, the season of ripening moves northward at the rate of about ten miles a day.

The human ear is so extremely sensitive that it can hear a sound that lasts only the twenty-four thousandth part of a second. Deaf persons have sometimes conversed together through rods of wood held between their teeth, or held to their throat or breast.

The ordinary pressure of the atmosphere on the surface of the earth is two thousand one hundred and sixty-eight pounds to each square foot, or fifteen pounds to a square inch; equal to thirty perpendicular inches of mercury, or thirty-four and a half feet of water.

Late scientific professors have ascertained, by a series of instrumental admeasurement of waves rising in a high swell after a violent storm, that the average height of the highest ocean waves does not exceed forty feet. The descriptions which we read of waves running "mountains high" are therefore only poetic hyperboles.

At a white heat all magnetism disappears; it is still sensible in iron when heated to a dark red glow.

The magnetic power of the compass needle

will be entirely destroyed or changed by being touched with the juice of an onion.

In the Arctic regions, when the thermometer is below zero, persons can converse more than a mile distant. Dr. JAMIESON asserts that he has heard every word of a sermon at the distance of two miles.

If a tallow candle be placed in a gun and be shot at a door, it will go through without sustaining any injury; and if a musket-ball be fired into water, it will rebound and be flattened as if fired against any hard substance. A musket-ball may be fired through a pane of glass, and if the glass be suspended by a thread it will make no difference, and the thread not even vibrate.

Why do candles and lamps "spirt" when rain is at hand? Because the air is filled with vapor, and the humidity penetrates the wick, where (being formed into steam) it expands suddenly, and produces a little explosion.

Why does a drop of water sometimes roll along a piece of hot iron without leaving the least trace? Because (when the iron is very hot indeed) the bottom of the drop is turned into vapor, which buoys the drop up, without allowing it to touch the iron.

Why do wet feet or clothes give us "cold?" Because, the evaporation absorbs the heat so abundantly from the surface of our body, that unless we keep actively exercising, its temperature is lowered below its natural standard; in consequence of which health is injured. This also explains why it is dangerous to sleep in a damp bed.

Why is the health injured when the temperature of the body is reduced below its natural standard? Because the balance of the circulation is destroyed, blood is driven away from the external surface by the chill, and thrown upon the internal organs, which are oppressed by this increased load of blood.

What is the cause of snow? When the air is nearly saturated with rain or vapor, and condensed by a current of air below freezing point, some of the vapor is condensed, and frozen into snow. A few years ago, some fishermen (who wintered at Nova Zembla), after they had been shut up in a hut for several days, opened the window; and the cold external air rushing in, instantly condensed the air of the hut, and its vapor fell on the floor in a shower of snow.

What is the cause of sleet? When flakes of snow (in their descent) pass through a bed of

air above freezing-point, they partially melt, and fall to the earth as half-melted snow.

What is hail? Rain which has passed in its descent through some cold bed of air, and has been frozen into drops of ice.

What is rain? The vapor of the clouds or air condensed, and precipitated to the earth.

Why are raindrops sometimes much larger than at other times? When the raincloud is floating near the earth, the drops are large, because such a cloud is much more dense than one more elevated. The size of the raindrop is also increased according to the rapidity with which the vapors are condensed.

How does the non-conducting power of snow protect vegetables from the frost and cold? It prevents the heat of the earth from being drawn off by the cold air which rests upon it.

Why are woolens and furs used for clothing in cold weather? Because they are very bad conductors of heat, and, therefore, prevent the warmth of the body from being drawn off by the cold air.

What then is the principal use of clothing in Winter time? To prevent the animal heat from escaping too freely; and to protect the body from the external air (or wind) which would carry away its heat too rapidly.

Window-glass can be cut under water with ordinary scissors.

To Make Glass Tumblers.—Take any kind of a glass bottle—bottles of thin white glass, with flat bottoms are the best—hold the bottle firmly by both ends; let another person pass a cotton cord twice around the bottle, and create a friction by pulling the ends of the cord to and fro rapidly for a minute or so; then let him jerk the cord off, and, presto! you hold in one hand as serviceable a tumbler as you wish, and in the other a neat but not gaudy candlestick. The bottle should be held with a strap, piece of leather, or other substance, with a hard, straight edge, firmly around it at the intended point of severance, in order to keep the cord in one place during the friction, and to secure straight and smooth edges to the glassware. Old bottles can be put to good use in this way.

The following different method sometimes works more successfully: Place the bottle in a vessel of water, to the height where it is designed to break it, and fill the bottle with water to the same level. Now pour coal oil inside and out on the water; cut a ring of paper fitting the bottle; saturate it with alcohol or benzine, and slip it down to the oil.

Pour some alcohol or benzine inside the bottle. Set on fire; the cold water prevents the glass from heating below its surface, while the expansion caused by the heat will break the vessel on the water line.

Facts of Human Life—The bodies of animals are continually undergoing a series of invisible changes of substance, of which they are entirely unconscious. We look at our hand to-day, as we write, and we fancy it is the same in substance as it was yesterday, or last year—as it was ten years ago. The form of each finger, of each nail, is the same. Scars made in our infancy are still there. Nothing is apparently altered or obliterated; and yet it is not the same hand. It has been renewed over and over again since the days of our youth. The skin and flesh, and bone have been frequently removed and replaced. And so it is, more or less, with our whole body. The arms and limbs that sustained us in our schoolboy struggles are long since consigned to the dust, and have, perhaps, lived over again more than once in plant, or flower, or animal. In from four to seven years, the entire body is taken out and built in again with new materials. A continued activity prevails among the living agencies to which this hidden work is committed. Every day a small part is carried away; just as if a single brick were every day taken out of an old wall, or a single wheel out of a watch, and its place supplied by another. The body, therefore, requires constant supplies, at every period of its life, of all those things of which its several parts are built up.

Vital Statistics.—The number of men in the world is equal to the number of women—a conclusive fact against polygamy and celibacy. One-quarter die before the age of seven. To every one thousand persons only one reaches the age of one hundred years, and not more than one in five hundred will reach the age of eighty. There are on the earth 1,200,000,000 inhabitants. Of these, 33,333,333 die every year, 91,824 die every day, 4,789 every hour, and 75 every minute—every throb of a healthy pulse knelling one human being into the land of souls. But reproduction asserts its superior power; for where sixty persons die, seventy babes are born.

Marriage is commended by the circumstance that the wedded are longer-lived than the single. Marriages are more frequent during the months of June and December. Those born in the Spring are more robust than others.

Births and deaths are more frequent by night than by day.

There have been, according to the record of Moses, less than two hundred generations since the creation; and less than sixty since the commencement of the Christian era. Out of 1,000 infants, who are nursed by the mother, about 300 die; of the same number committed to the charge of strange nurses, 500 perish. Among 115 deaths there may be reckoned one woman in giving birth.

By observations made during the space of fifty years, it has been found that the greatest number of deaths has been in the month of March, and next to that in the months of August and September; in November, December, and February, there are the fewest deaths; 249 take place in Winter, 286 in Spring, 225 in Summer, and 237 in Autumn.

The first month, and especially the first day of birth, are marked by the greatest number of deaths; of 2,735 infants who die during the first month, 1,192 die on the first day. The number of twins is to that of the whole number of single births as one in sixty-five. The number of marriages is to that of the inhabitants of a country as 175 to 1,000.

The average weight of a woman—124 pounds—is to the average weight of a man—140 pounds—as 57 to 98; but her brain is relatively larger, being to man's brain as 90 to 100.

The laws of life seem to be very capricious and erratic; but, in fact, Death cuts his swath across the earth with great regularity. Out of one hundred thousand persons born at any particular time, a certain number will yield up their life in each year; in other words, the aggregate will be diminished in an increasing but regular proportion till none are left alive. Taking ten thousand persons of the age of fifty-two, we will find that one hundred and fifty-two will die before reaching fifty-three, and so on. It is said that with reference to the whole population of London, the same number of deaths by consumption occur in that city each year, and similar regularity is confidently predicated of the various other contingencies to which life is subject.

The Chance for Long Life Increasing.—The test of longevity exhibits the greatest triumph for civilization, because here the life insurance tables furnish ample, though comparatively recent statistics. Of course, in legendary ages all lives were of enormous length; METHUSELAN lived almost a thousand years; and the Hindoos in their sacred books attribute to their

progenitors a career of forty million years or thereabouts—what may safely be termed a ripe old age. But, from the beginning of accurate statistics, we know that the duration of life in any nation is a fair index of its progress in civilization.

QUETELET gives statistics, more or less reliable, from every nation of northern Europe, showing a gain of ten to twenty-five per cent. during the last century. Where the tables are most carefully prepared, the result is least equivocal. Thus, in Geneva, where accurate registers have been kept for three hundred years, it seems that from 1560 to 1600 the average lifetime of the citizens was twenty-one years and two months; in the century following, thirty-two years and nine months; and in the year 1833, forty years and five months; thus nearly doubling the average age of man in Geneva within those three centuries of social progress.

In France it is estimated that, in spite of revolutions and NAPOLEONS, human life has been gaining at the rate of two months a year for nearly a century. By a manuscript of the fourteenth century, moreover, it is shown that the rate of mortality in Paris was then one in sixteen—one person dying annually to every sixteen of the inhabitants. It is now one in thirty-two—a gain of a hundred per cent. in five centuries. In England the progress has been far more rapid. The rate of mortality in 1690 was one in thirty-three; in 1780 it was one in forty; and it stands now at one in sixty—the healthiest country in Europe.

In other words, the average duration of human life has doubled within three centuries; and this improvement is due to the more settled state of society, to the decreasing wars, to the multiplied comforts of life, and to the advance in sanitary knowledge and regulations of recent years. As the growth of morality and culture represses vice, this improvement in health and in prolonged life will be more marked than at present.

Comparative Longevity.—A statistician has recently shown that man's longevity is—striking an average—in exact proportion to his educational attainments, provided that his health has not been injured by undue confinement or overmental exertion. The best educated communities are the longest lived, and the best educated soldiers live amazingly longer than the ignorant and seem to wear a charmed life; not so much against bullet and bayonet, as against the effects of disease, privation, and wounds on their constitutions and lives.

It is also a well-known fact that the mountaineer lives longer than the lowlander; the farmer than the mechanic; the traveler than the sedentary; the temperate than the self-indulgent; the just than the dishonest. In five things are the secrets of health: Fresh air; clean water; appetites restrained; passions controlled; and that highest type of physical exercise, "going about doing good."

It is not a surprising circumstance that Quakers live longer than any other people; longevity naturally results from simplicity of habits, quietness of demeanor, restraint of temper, control of appetite, and a systematic, even mode of life. It is by such funding of vitality that men occasionally outlast a century; by this means the Englishman, PARR, lived to be 152, having married, hale and hearty, at 120! In this way HENRY JENKINS lived to 169, dying in Yorkshire in 1670—the most remarkable authentic instance of longevity.

Yet it is no doubt true that

"We live in deeds, not years; in thoughts, not breaths;
In actions, not in figures on a dial!"

and that the man has lived longest, whatever the number of his years, whose life-purpose has been the highest, and who has brought himself to bear most effectively on mankind. In this view, METHUSELAH was doubtless a mere infant when he died; and many have cheerfully changed worlds at forty whose work here was to be measured by centuries.

Among one hundred individuals of each profession in Germany, Dr. CASPAR found that the number attaining the age of 70 was as follows, respectively: Theologians, 43; agriculturists, 40; politicians, 35; merchants, 35; military men, 32; lawyers, 29; artists, 28; college professors and physicians, 27.

The conclusions drawn from an English census give lawyers, doctors, and scholars a longer lease of life—more in accordance with facts. Literary occupations seem, on the whole, favorable to long life. Many of the first literators of ancient and modern times, men the most distinguished for severe application throughout long lives, have lived to a very advanced age—as HUMBOLDT, ALBERT GALLATIN, JOHN ADAMS, and College Presidents ROUTH, JOSIAH QUINCY, NOTT, and DAY.

The man that dies youngest, as might be expected, perhaps, is the railway brakeman. His average age is only twenty-seven. Yet this must be taken with some allowance, from the fact that hardly any but young and active men are employed in that capacity. At the same

age dies the factory workwoman, through the combined influence of confined air, sedentary posture, scant wages, and unremitting toil. Then comes the railway baggage-man, who is smashed on an average at thirty. Milliners and dressmakers live but little longer; the average of the one is thirty-two, and the other thirty-three. The engineer, the fireman, the conductor, the powder-maker, the well-digger, and the factory operative, all of whom are exposed to sudden and violent deaths, die on an average under the age of thirty-five. The cutler, the dyer, the leather-dresser, the apothecary, the confectioner, the cigarmaker, the printer, the silversmith, the painter, the shoe-cutter, the engraver, and the machinist, all of whom lead confined lives in an unwholesome atmosphere, do not reach an average of forty.

The musician blows his breath all out of his body at forty-two. Then come trades that are active or in a pure air. The baker lives to an average of forty-three, the butcher to forty-nine, the brickmaker to forty-seven, the carpenter to forty-nine, the furnace-man to forty-two, the mason to forty-eight, the sailor to forty-three, the stonecutter to forty-three, the tanner to forty-nine, the tinsmith to forty-one, the weaver to forty-four, the drover to forty, the cook to forty-five, the innkeeper to forty-six, the female domestic to forty-three, the tailor to forty-three, the tailoress to forty-one. Why should the barber live till fifty, if not to show the virtue there is in personal neatness and soap and water? Those who average over half a century among mechanics are those who keep their muscles and lungs in healthful and moderate exercise, and are not troubled with weighty cares.

The blacksmith hammers till fifty-one, the cooper till fifty-two, and the wheelwright till fifty. The miller lives to be whitened with the age of sixty-one. The ropemaker lengthens the thread of his life to fifty-five; merchants, wholesale and retail, to sixty-two. Professional men live longer than is generally supposed; litigation kills clients sometimes, but seldom lawyers, for they average fifty-five. Physicians prove their usefulness by prolonging their own lives to the same period. The caulker averages sixty-four, the sailmaker fifty-two, the stevedore fifty-five, the ferryman sixty-five, and the pilot sixty-four. A dispensation of Providence that "Maine law" men may consider incomprehensible is, that brewers and distillers live to the ripe old age of sixty-four. Last and longest, come paupers, sixty-seven, and "gentlemen," sixty-eight! The only two

classes that do nothing for themselves, and live on their neighbors, outlast all the rest.

Facts in Physiology.—There are 518 bones in the human frame; 14 in the face, 32 teeth, 24 in the ribs, 16 in the wrists, 38 in the hands, 14 in the ankles, 38 in the feet, and 342 in other parts of the body.

The muscles are about 500 in number.

The length of the alimentary canal is about thirty-two feet.

The amount of blood in an adult is near 30 pounds, or full one-fifth of the entire weight.

There are 600,000,000 cells in the lungs, that, if spread out, would cover a surface seven times as large as the human body, and the membrane lining the intestinal canal is thirty times as large.

The heart is six inches in length and four inches in diameter, and beats 70 times per minute, 4,200 times per hour, 100,800 times per day, 36,772,000 times per year, 2,565,440,000 in three-score and ten, and at each beat two and a half ounces of blood are thrown out of it, 175 ounces per minute, 656 pounds per hour, seven and three-fourth tons per day. All the blood in the body passes through the heart every three minutes. This little organ, by its ceaseless industry,

In the allotted span
The Psalmist gave to man,

lifts the enormous weight of 360,700,200 tons.

The lungs will contain about one gallon of air, at their usual degree of inflation. We breathe, on an average 1,200 times per hour, inhaling 600 gallons of air, or 14,400 gallons per day. The aggregate surface of the air-cells of the lungs exceeds 20,000 square inches, an area very nearly equal to the floor of a room twelve feet square.

The average weight of the brain of the adult male is three pounds and six ounces; of a female, two pounds and eight ounces. The nerves are all connected with it, directly or through the spinal marrow. These nerves, together with their branches and minute ramifications, probably exceed 10,000,000 in number, forming a "body guard" outnumbering by far the mightiest army ever marshaled!

The skin is composed of three layers, and varies from one-fourth to one-eighth of an inch in thickness. Its average area in an adult is estimated to be 2,000 square inches. The atmospheric pressure being about fourteen pounds to the square inch, a person of medium size is subjected to a constant pressure of 40,000 pounds!

Each square inch of skin contains 3,500 sweating tubes, or perspiratory pores, each of which may be likened to a little drain-tile one-fourth of an inch long, making an aggregate length over the entire surface of the body of 301,166 feet, or a tile-ditch for draining the body almost forty miles long.

Man is made marvelously. Who is eager to investigate the curious, to witness the wonderful works of OMNIPOTENT WISDOM, let him not wander the wide world round to seek them, but examine himself. "The proper study of mankind is man."

There is iron enough in the blood of forty-two men to make a plow-share weighing about 24 pounds. The skeleton of a man weighs from 12 to 16 pounds, and the blood 28 to 30 pounds. The muscles of the human jaw exert a force of 534 pounds, and those of mastiffs and wolves far more. The human brain is the fortieth of the body, but in the horse but a four-hundredth. A healthy liver weighs nearly 4 pounds, but diseased ones will sometimes weigh from 12 to 15 pounds.

One of the most inconceivable things in the nature of the brain, says HALL'S *Journal of Health*, is that the organ of sensation should in itself be insensible. To cut the brain gives no pain, yet in the brain alone resides the power of feeling pain in any part of the body. If the nerve which leads from it to the injured part be divided, it becomes instantly unconscious of suffering. It is only by communication with the brain that any kind of sensation is produced, yet the organ itself is insensible. But there is a circumstance more wonderful still; the brain itself may be removed—may be cut away down the *corpus colium*—without destroying life. The animal lives, and performs all its functions which are necessary to simple vitality, but no longer has a mind; it can not think or feel. It requires that the food should be pushed into the stomach—once there, it is digested, and the animal will live and grow fat.

The average height of babes, at birth, is generally sixteen inches. In each of the twelve years after birth, one-twelfth is added to the stature each year. Between the ages of twelve and twenty, the growth of the body is slower; and it is still further diminished after this, up to twenty-five, the period of a maximum growth.

In old age, the height of the body diminishes, on an average, about two inches. The height of woman varies less than that of man in the different countries. The average weight

of a male infant is about seven pounds; of a female, about six and a half pounds. The weight of an infant decreases for a few days after its birth, and it does not sensibly commence gaining until it is a week old. At the end of the first year, the child is three times as heavy as when it was born. At the age of seven years, it is twice as heavy as when a year old. The average weight of both sexes at twelve is nearly the same; after that period, females will be found to weigh less than males of the same age. The average weight of men is about one hundred and forty pounds, and of women one hundred and twenty pounds. In the case of individuals of both sexes, under four feet four inches, females are somewhat heavier than men, and *vice versa*. Men attain their maximum weight at about forty, and women at or near fifty. At sixty, both sexes usually commence losing weight, so that the average weight of old persons, men or women, is nearly the same as at nineteen.

The Average Height.—The average height of conscripts, twenty years of age, taken from the whole of France, for renewing the imperial armies, is found to be only five feet three inches and a half.

Young men in a good station in life are rather taller than those who have more privations to bear. Of eighty Cambridge, England, students, between eighteen and twenty-three years of age, the average height was over five feet nine inches. It appears to be pretty certain, from the average of a large number of instances, that the height remains constant only from the age of thirty to fifty; a slight average growth until the former limit—a slight average diminution after the latter. Among all the adults of all classes, measured by M. QUETELET, he found that fully developed and well-formed men varied from four feet ten inches, to six feet two inches, with an average of five feet six; and fully developed and well-formed women varied from four feet seven to five feet eight, with an average of about five feet two.

The Hairs of the Head Numbered.—To number the hairs of the head has been in all ages accounted as impossible as feat as to count the sands of the sea-shore. The astonishing labor has, however, been gone through by a patient German professor, who thus tabularizes the result of his examination of four heads of hair:

Blonde (number of hairs).....	110,100
Brown " " ".....	109,140
Black " " ".....	102,902
Red " " ".....	88,410

The heads of hair were found to be nearly

equal in weight, and the deficiency in the number of hairs in the black, brown, and red colors was fully counter-balanced by a corresponding increase of bulk in the individual fibers. The average weight of a woman's head of hair is about fourteen ounces.

Statistics of Marriage.—If we take one hundred to represent the whole of a woman's chances of marriage between the ages of 15 and 70, the proportional chances in each period of five years will be as follows:

Age.	Chances of Marriage.
15 and under 20	14 2
20 " " 25	5 2
25 " " 30	1 2
30 " " 35	1 2
35 " " 40	3 4
40 " " 45	2 4
45 " " 50	1 2
50 " " 55	1 2
55 " " 60	1 2
60 " " 65	1 2
65 " " 70	1 2
	100

From the table it appears:

1. That one-seventh part of all the females who marry in England, are married between the ages of 15 and 20, or one-seventh part of a woman's chances of marriage lie between those years.

2. That fully one-half of all the women who marry are married between 20 and 25, or one-half of a woman's chances are comprised within these five years.

3. That between 15 and 25, precisely two-thirds of a woman's chances of marriage are exhausted, and only one-third remains for the rest of her life up to 70.

4. That at 30 no less than 35 chances out of the 100 are gone, and 15, or about one-seventh, only remain. She has strong reasons now for improving her time.

5. At 35, a fraction (a tenth) is all that remains to her—which is reduced to a twentieth at 40.

6. At 45 her chances of marriage have sunk to one-fortieth; and at 50 to one-hundredth. At 60 there is still a glimmering of hope, for it appears that among females about 1 marriage in 1,000 takes place at and beyond this age.

The number of women married between 15 and 20 is six times greater than the number of men.

The number of men and women married between 20 and 25 is very nearly equal, but the number of men married at all higher ages is greater than the number of women.

Occupations.—There is one farmer to every ten people; one manufacturer to every sixty-five people; one merchant to every two hundred and fifty people; one physician to every six

hundred people; one clergyman to every eight hundred people; one lawyer to every thousand people.

The Population of the World.—The population of the earth is rapidly increasing under the advancement of civilization and the comparative prevalence of peace, and now numbers not less than 1,200,000,000, divided as follows;

America	75,000,000
Europe	253,000,000
Africa	115,000,000
Asia	700,000,000
Japan	35,000,000
Oceania	22,000,000
	1,200,000,000

Languages.—The least learned are aware that there are many languages in the world, but the actual number is probably beyond the dreams of ordinary people. The geographer, BALBI, enumerated 860, which are entitled to be considered as distinct languages, and 5,000 which may be regarded as dialects. ADELUNG, another modern writer on this subject, reckons up 3,064 languages and dialects existing, and which have existed; of these, he assigned 587 to Europe, 936 to Asia, 276 to Africa, and 1,264 to America.

Origin of the English Language.—Suppose the English language, says TRENCH, to be divided into a hundred parts; of these, to make a rough distribution, sixty would be Saxon, thirty would be Latin, five would be Greek; we should thus have assigned ninety-five parts, leaving the other five words, perhaps too large a residue, to be divided among all the other languages from which we have adopted isolated words. The Lord's Prayer contains sixty words, of which six only claim Latin origin—"trespass," "trespasses," "temptation," "deliver," "power," "glory"—and Saxon words might easily be substituted for these. The Anglo-Saxon words in our language are those of greater primary necessity; because this was the aboriginal element, whereon the Latin is a graft. All the joints of the language, its sinews and ligaments, its articles, pronouns, propositions, conjunctions, numerals, auxiliary and small verbs, the words, in short, which serve as links to bind its sentences together, are Saxon; while its Latin words, whether adopted directly or obliquely through the French, are those which give elegance and variety, and extend discussion in philosophy and theology, in abstruse themes and recondite sciences. It is easy to form a sentence on any subject without a word of Latin derivation, while it is almost impossible to form a sentence without a Saxon word.

We should confidently conclude, continues TRENCH, that the Norman was the ruling race, from the noticeable fact that all the words of dignity, state, honor, and pre-eminence, with one remarkable exception, descend to us from them; sovereign, scepter, throne, realm, royalty, homage, prince, duke, count, chancellor, treasurer, palace, castle, hall, dome, and a multitude more. At the same time, the remarkable exception of "king," would make us, even did we know nothing of the actual facts, suspect that the chieftain of this ruling race came in upon an old title, not as overthrowing a former dynasty, but claiming to be in the rightful line of its succession.

And yet, while the stately superstructure of the language, almost all articles of luxury, all that has to do with the chase, with chivalry, with personal adornment, is Norman throughout; with the broad basis of the language, and therefore of the life, it is quite otherwise. The great features of nature, sun, moon, and stars, earth, water, and fire; all the prime social relations, father, mother, husband, wife, son, daughter, these are Saxon. The palace and the castle may have come to us through the Norman; but to the Saxon we owe the dearer names, the house, the roof, the home, the hearth. The implements used in cultivating and harvesting the productions of the earth, the plow, the sickle, the flail, the spade, are expressed in his language; so are the main products themselves, as wheat, rye, oats, bere, *i. e.* barley, and no less the names of domestic animals.

Concerning these last, it is not a little characteristic to observe that the names of almost all animals, as long as they are alive, are thus Saxon, but when dressed and prepared for food they become Norman—a fact, indeed, which we might have expected beforehand; for the Saxon hind had the charge and labor of tending and feeding them, but only that they might appear on the table of his Norman lord. Thus, ox, cow, steer, are Saxon, but beef Norman; calf is Saxon, but veal Norman; sheep is Saxon, but mutton Norman; so it is severally with swine and pork, deer and venison, fowl and pullet. Bacon, the only flesh, perhaps, which ever came within the Saxon's reach is the single exception.

Number of Words in Use.—Professor MAX MULLER quotes the statement of a clergyman that some of the laborers in his parish had not 300 words in their vocabulary. A well-educated person seldom uses more than about 3,000

or 4,000 words in actual conversation. Accurate thinkers and close reasoners, who select with great nicety the words that exactly fit their meaning, employ a much larger stock, and eloquent speakers may rise to a command of 10,000. SHAKESPEARE, who displayed a greater variety of expression than probably any other writer in any language, produced all his plays with about 15,000 words. MILTON's works are built up with 8,000, and the Old Testament says all that it has to say with 5,642 different words. There are now something like 115,000 words in the English language.

The Universe.—As a proof of what an immense book the heavens are, and also of the indefatigability of the student, man, in turning over its leaves, Dr. NICHOL, in his work describing the magnitude of Lord Rosse's telescope, says that Lord Rosse has looked into space a distance so tremendous, so inconceivable, that light, which travels at the rate of 200,000 miles in one second, would require a period of 250,000,000 of solar years to pass the intervening gulf between this earth and the remotest point to which this telescope has reached! How utterly unable is the mind to grasp even a fraction of this immense period; to conceive the passing events of a hundred thousand years only, is an impossibility, to say nothing of millions and hundreds of millions of years.

The sun is ninety five million of miles distant from the earth, yet a ray of light will traverse that immense distance in 480 seconds; long as the distance may seem to be passed in so short a time, what comparison can the mind frame between it and that great distance, which Drs. NICHOL and ROSSE demonstrate, would require every second of time to represent more than 500,000 years! And the study of astronomy is not only useful to excite emotions of grandeur and sublimity at such discoveries, but it is the basis of navigation and our note of time, and unites the strictness of our mathematical reasoning with the most certain calculation.

Number of Stars.—To our naked eye are displayed about 3,000 stars, down to the sixth magnitude. Thus far the heavens were the same to the ancients that they are to us. But within the last two centuries our telescopes have revealed to us forty or fifty planets, and countless millions of stars, more and more astonishingly numerous the farther we are able to penetrate into space. The number of

stars may be really infinite, says Sir JOHN HERSHEY, in the only sense in which we can assign a meaning to the word.

Says SAMUEL WARREN, "Fourteen thousand years of the history of the inhabitants of these systems; if inhabitants there be, had passed away during the time that a ray of their light was traveling to this tiny residence of curious little man! Consider for a moment, that that ray of light must have quitted its dazzling source eight thousand years before the creation of Adam!"

The Vastness of Creation.—Faint white specks are visible, says EVERETT, even to the naked eye of the practiced observer, in different parts of the heavens. Under high magnifying powers, several thousand of such spots are visible; no longer, however, faint white specks, but many of them resolved, by powerful telescopes, into vast aggregations of stars, each of which may, with propriety, be compared to the milky way. Many of these nebulae, however, resisted the power of Sir JOHN HERSHEY's great reflector, and were, accordingly, still regarded by him as masses of unformed matter, not yet condensed into suns. This, till a few years since, was the prevailing opinion. But with the increase of instrumental power, the most insoluble of these nebulae have given way; and the better opinion now is, that every one of them is a galaxy, like our own milky way, composed of millions of suns. In other words, we are brought to the bewildering conclusion, that thousands of these misty specks, the greater part of them too faint to be seen with the naked eye, are not each a universe like our solar system, but each a "swarm" of universes, of unappreciable magnitude. The mind sinks overpowered by the contemplation. We repeat the words, but they no longer convey distinct meanings to the understanding.

The Solar System Illustrated.—In order to convey to the mind of the reader a general impression of the relative magnitudes and distances of the parts of our system, "choose," says Sir JOHN HERSHEY, "any well-leveled field. On it place a globe two feet in diameter to represent the Sun; Mercury will be represented by a grain of mustard-seed, on the circumference of a circle 16½ feet in diameter, for its orbit; Venus, a pea, on a circle 28½ feet in diameter; the Earth, also a pea, on a circle of 430 feet; Mars, a rather large pin's head, on a circle of 654 feet; Juno, Ceres, Vesta, and Pallas, grains of sand, in orbits of from 1,000 to 1,200 feet; Jupiter, a moderate-sized orange,

on a circle of half a mile; Saturn, a small orange, on a circle of four-fifths of a mile; and Uranus, or Herschel, a full-sized cherry, or small plum, on the circumference of a circle more than a mile and a half in diameter. To imitate their motions, Mercury must describe its orbit in forty-one seconds; Venus, in four minutes and four seconds; Earth, in seven minutes; Mars, in four minutes and forty-eight seconds; Jupiter, in two hours and fifty-six minutes; Saturn, in three hours and thirteen minutes; Uranus, in two hours and sixteen minutes." Scarcely any notion can be had from drawings on paper, or those very childish toys called orreries.

LE VERRIER, the discoverer of the planet Neptune, wrote to GALLE, of Berlin, saying: "This star no one has seen, but it exists. I have measured its distance; I have estimated its size; I have calculated its diameter. *It is there.* Look for it, and you will find it." He looked—it was discovered from the Observatory of Berlin, on the 23d of September, 1846, just where the student, in his closet, had told the practical astronomer he would find it!

The Earth.—Of the age of the earth, AGASSIZ writes: "Among the astounding discoveries of science, is that of the immense periods that have passed in the gradual formation of the earth. So vast were the cycles of the time preceding even the appearance of man on the surface of our globe, that our own period seems as yesterday when compared with the epochs that have gone before it. Had we only the evidence of the deposits of rocks heaped on each other in regular strata by the slow accumulation of materials, they alone would convince us of the long and slow maturing of God's work on earth; but when we add to these the successive population of whose life the world has been the theater, and whose remains are hidden in the rocks into which the mud or sand, or soil of whatever kind on which they lived, has hardened in the course of time—or, the enormous chain of mountains, whose upheaval divided these periods of quiet accumulation by great convulsions—or, the changes of a different nature in the configurations of our globe, as the sinking of lands beneath the ocean, or the gradual rising of continents and islands above; or, the slow growth of the coral reefs, whose wonderful sea walks raised by the little ocean architects, whose own bodies furnish both the building-stones and the cement that binds them together, and who have worked so busily during the long centuries that there are extensive

countries, mountain-chains, islands, and long lines of coast consisting solely of their remains—or, the countless forests that have grown up, flourished, and decayed, to fill the storehouse of coal that feeds the fires of the human race—if we consider all these records of the past, the intellect fails to grasp a chronology of which our experience furnishes no data, and time that lies behind us seems as much an eternity to our conception as the future that stretches indefinitely before us.”

A railway train, traveling at twenty-five miles an hour, would require six weeks to go around the earth. This globe weighs about six million billions of tons!

The earth is believed to have not two motions only, but three; one on its axis, a thousand miles an hour; another around the sun, a thousand miles a minute, and the third with the solar system through space—for our sun, with his brood of planets, is moving with prodigious velocity, at the rate of five hundred miles a minute, toward a particular point in the heavens, a star in the constellation Hercules, perhaps, sweeping a measureless orbit around some remoter sun!

The Aurora Borealis.—Scientific men have long felt that there was a strange secret hidden in the beautiful folds of the aurora. The magic arch, with its pointed streamers shifting silently but swiftly across the heavens, pulsating mysteriously, as though illuminated by the fitfully changing glow of some concealed furnace, and rendered surpassingly beautiful by the brilliancy of its colors, had always had strange charms for men of thoughtful mind. And, gradually, a series of laborious researches has revealed the law which associates this beautiful apparition with disturbances affecting the economy of our whole earth, and not indistinctly connected with the habitudes of the solar system itself.

Prof. LOOMIS, of Yale College, pronounces the auroral beams “simply spaces which are illumined by the flow of electricity through the upper regions of the atmosphere.” He continues: “They exhibit an endless variety of appearances. In the United States an aurora is uniformly preceded by a hazy or slaty appearance of the sky, particularly in the neighborhood of the northern horizon. When the auroral display commences, this hazy portion of the sky assumes the form of a dark bank or segment of a circle in the north, rising ordinarily to the height of from five to ten degrees. This dark segment is not a cloud, for the stars

are seen through it as through a smoky atmosphere, with little diminution of brilliancy. This dark bank is simply a dense haze, and it appears darker from the contrast with the luminous arc which rests upon it.

“The height of a large number of auroras has been computed, and the average result for the upper limit of the streamers is four hundred and fifty miles. From a multitude of observations, it is concluded that the aurora seldom appears at an elevation less than about forty-five miles above the earth’s surface, and that it frequently extends upward to an elevation of five hundred miles. Auroral arches, having a well-defined border, are generally less than one hundred miles in height.

“Auroral exhibitions take place in the upper regions of the atmosphere, since they partake of the earth’s rotation. All the celestial bodies have an apparent motion from east to west, arising from the rotation of the earth; but bodies belonging to the earth, including the atmosphere and the clouds which float in it, partake of the earth’s rotation, so that their relative position is not affected by it. The same is true of auroral exhibitions. Whenever an auroral corona is formed, it maintains sensibly the same position in the heavens during the whole period of its continuance, although the stars meanwhile revolve at the rate of fifteen degrees per hour.

“The grosser part of the earth’s atmosphere is limited to a moderate distance from the earth. At the height of a little over four miles, the density of the air is only one-half what it is at the earth’s surface. At the height of fifty miles the atmosphere is well-nigh inappreciable in its effect upon twilight. The phenomena of lunar eclipses indicate an appreciable atmosphere at the height of sixty-six miles. The phenomena of shooting-stars indicate an atmosphere at the height of two hundred or three hundred miles, while the aurora indicates that the atmosphere does not entirely cease at the height of five hundred miles. Auroral exhibitions take place, therefore, in an atmosphere of extreme rarity; so rare indeed that if, in experiments with an air pump, we could exhaust the air as completely, we should say that we had obtained a perfect vacuum.”

The London *Spectator* for October, 1869, announces the results of more recent experiments. Spectroscopic analysis, that strange and powerful mode of research which has revealed so many unlooked-for facts, has showed that the aurora, instead of being a rainbow-colored

streak of light, such as would have appeared if it were due to the existence of particles excited to luminosity by electrical action, was a single line of colored light. This proves that the light results from the incandescence of some gas, through the agency of electricity. What this gas is, is now the problem. The savans of Germany have approached its solution so far as to demonstrate that the ray seen in the spectrum of the aurora is the same as that resulting from the zodiacal light; and it is believed that the tails of comets have an origin in common with both.

Differences of Climate.—Isothermal lines, as traced on a map, are imaginary lines connecting all points having the same mean temperature the year round. Near the equator the isothermals exhibit no great or sudden divergence; but as we recede from the equator, northwardly or southwardly, their deflections become remarkable, sometimes ranging, in their circuit of the globe, through twenty or thirty degrees of latitude.

Judge J. G. KNAPP, of Wisconsin, has presented to the Legislature a valuable report on Forest Trees, from which we make a citation: "People are apt to look upon the climatical zones of the earth as identical with the zones of latitude, or but slightly varied from that relation. Hence we often hear the expression of one place lying in the same latitude as another, as meaning that the two have a similar climatology. This is only true when all other relations are identical, and not otherwise. Two countries on the same parallel, equally elevated, equally distant from the sea, on the same side of a continent, exposed to wind of the same character for temperature and aridity, and influenced by the same kind of ocean currents, will have an identical climatology; so two islands in the same mid-ocean, as in the great Pacific, will be alike in climate. But change any of these conditions and the whole climatology is changed.

"The annual isotherm of forty-five degrees of temperature passes nearly east and west through Portage City, Wisconsin, and Concord, New Hampshire, making but slight deflections from a straight line, on account of the influence of the great lakes, and the mountains of New York, Vermont, and New Hampshire.

"The isotherm of forty-five degrees, during the Spring months, enters the continent at Boston, passes Albany along the south shore of Lake Ontario, through Detroit, around the

south end of Lake Michigan, through Portage City, and thence by St. Paul to the valley of the Saskatchewan river. This line is spread out some seventy miles wide, as it passes over New York, and is very crooked, showing in a remarkable degree the effect of high lands and the cool lakes. On the west of us, it passes twice above the fiftieth parallel of latitude, and once, in New Mexico, it goes below the parallel of thirty-six and a half.

"The isotherm of seventy degrees in Summer passes through Wisconsin in about the same direction as that of the Spring line of forty-five degrees, except running farther east in Wisconsin, but it reaches the south end of Lake Michigan from Harrisburg and Pittsburg, in Pennsylvania, and near the line of the Fort Wayne Railroad. The isotherm of forty-eight degrees in the Fall must be drawn from Copper Harbor, on Lake Superior, through Green Bay and Fond du Lac, thence west by Portage City to the Mississippi river."

So, also, Great Britain, which is in the latitude of the lower part of Hudson's Bay, has the mean temperature of New York, while that city is in the latitude of Spain and Italy. The isotherm that traverses Lake Michigan deflects thence to the northwestward up the Pacific coast till it touches Alaska, also strikes northeastward down the St. Lawrence, through Halifax, and up the Atlantic, passing near the coast of Iceland and the Arctic circle as far north as Greenland. The northern shore of Lake Superior has about the same annual cold as Behring's straits—an average of thirty-two degrees Fahrenheit, the freezing point!

There is no doubt that a vast amount of heat is transported from the tropical to the temperate and frozen regions of the earth by the great oceanic currents. The Gulf stream in the Atlantic constantly sweeps from the West Indies northeastward against the British islands and western Europe, lending to them something of the fervor of the Caribbean sea; and through the Pacific rushes a similar stream, sending the isothermal lines northward across the Aleutian isles.

Sir JOHN HERSCHEL estimates the Gulf stream as equal to a current thirty miles wide, two thousand two hundred feet deep, and flowing at the rate of four miles per hour. This gives 7,359,900,000 cubic feet per hour, and as the temperature of the water in the tropics is comparatively high (86° Fahrenheit), the influence of such a stream in the distribution of the heat of the globe must be enormous.

But this is probably only one of several causes of the deflection of the lines of temperature. The late expeditions to the Arctic seas indicate, if they do not prove, the existence of two north poles of cold, which are also magnetic poles, near the northern coasts of the Eastern and Western continents, a thousand miles apart, with the geographical pole midway between. The Asiatic pole of cold is located by KAEMTZ just off the coast of Siberia, and the American pole to the west of Baffin's bay, about the region where Sir JOHN FRANKLIN'S crew perished. These are made the centers of cold, and the prime causes of the dip of the isothermal lines into the continents and their sudden rise in the great oceans between.

Zones of Vegetation.—Again we have recourse to the report of Judge KNAPP: "Something almost amounting to definiteness may be determined in relation to our isothermal lines, without any reference to the thermometer, by the vegetation of the country. Some vegetables require a certain amount of heat to bring them to perfection; and others are destroyed by the depression of the thermometer to a certain point. In some instances these conditions are found in the same plant: Indian corn, the cucurbitaceæ, tobacco, and some others are examples of plants requiring a high temperature to bring them to perfection.

"Indian corn will not ripen in England, or at the mouth of the Columbia river, in Oregon! though the annual isotherm of both places is much above that of Madison, Wisconsin. The various species of melons, squashes, cucumbers, and others of the same natural order, will not there form sets unless under glass, and aided by bottom heat, although the plants can remain in the open air, in a growing condition, for eight months in the year. Varieties of the corn and melons mark very faithfully the different Summer isotherms. Thus, though the annual temperature of Madison corresponds with Portland, Maine, yet our Summer permits the corn and melons of the District of Columbia to ripen well at this place.

On the other hand, the Winter isotherms are to be determined by perennials: Thus, we find that some trees and shrubs that thrive well at Albany, New York, are killed here in Wisconsin by the excessive cold that passes to us from the great wind gap. So the peach tree will live at Portland, Maine, but requires a wall to ripen its fruit; while the fruit would ripen by our Summer heat without such aid, but the tree is often killed here by a Winter temperature

equal to that of Quebec. Could we protect such trees by covering, as we do grape vines, there would be no other difficulty in producing their fruits.

Therefore, taking the annual and perennial vegetation as our guides, there is no great difficulty in determining the lines of temperature. But taking them as guides we shall be surprised to see how those lines will cross each other in this State, at almost right angles. We should find that the Summer isotherm of seventy degrees, or that of Baltimore, the line of the dent corn and black Spanish watermelon, traverses Wisconsin, running northwest to St. Paul, while that of twenty degrees in Winter, the extreme limit of the chestnut, runs northeast to Green Bay. This changeability of lines is in a large degree owing to the influence of the great lakes."

Where the Cold Comes From.—We take the following from the *Scientific Annual*: "Our observations of the cold terms for several years, show that the icy wave comes down over the central portion of this continent, striking our Western States, and passing over to the ocean in a southeasterly direction. The cold wave does not affect the Pacific shore; it comes down from the Arctic regions upon the Rocky mountains, and then turns eastward, so that the first news we have of it, days before it reaches here, is from Minnesota, Nebraska, and Utah. It follows the valleys and the course of the waters, and spends itself over the Gulf streams, where it warms again, and rising as it expands, is wafted back in the upper atmosphere. The cold-air current is just the opposition to the warm-water current which we call the Gulf stream. That comes from the torrid zone westerly, and is turned northwardly by the configuration of the lands, as the cold-air wave is eastward when it strikes the mountains, and thence runs along our coast, affecting the climate of the lands near it, till it loses itself in the Northern ocean and ice."

The Moon's Influence on the Weather.—Ignorance and superstition have attributed to the moon's occult influence more importance than science and enlightened observation assign to it. Not only in past ages, but at this present moment, millions believe that the moon possesses a mysterious and most awful agency, to bless or ban, to invigorate or blight; and that her celestial favor is propitiated by first beholding her over the right shoulder, and by tremblingly obeying the laws which tradition has preserved.

According to vulgar belief, our satellite presides over human maladies; and the phenomena of the sick chamber are governed by the lunar phases; nay, the very marrow of our bones, and the weight of our bodies, suffer increase or diminution by its influence. Nor is its imputed power confined to physical or organic effects; it notoriously governs mental derangement. Some successful gardeners still rigidly observe the rule of planting according to the changes of the moon, declaring that all vegetables of the vine kinds, as beans, peas, potatoes, etc., bear more luxuriantly if planted in the first three or four days after full moon; and that corn planted on the decline of the moon will make heavier ears than if planted at any other time.

The angry Red Moon is hostile to all vegetable life; the waxing moon smiles upon standing forests, but smites with worms and rot all that is felled; oysters and clams shrivel up and diminish in size, during the wane—an emaciation probably caused by sadness at the fading of the luminary; the full moon changes the complexion; the new moon withers wheat, so that the seller is cheated in the measure—for these miraculous effects are attested by such distinguished names as **PLINY**, **PLUTARCH**, and **LUCILIUS**!

Philosophers long ago began to question the alleged phenomena themselves, as well as the lunar deductions. "Truly," says **M. ARAGO**, the eminent French scientist, "we have need of a robust faith to admit without proof that the moon, at the distance of one hundred and forty thousand miles, shall in one position act advantageously upon the vegetation of beans, and that in the opposite position, and at the same distance, she shall be propitious to lentils."

The moon may have an effect upon the weather, but it is so small as to be scarcely discernable, and affords apparently no ground for the lunar theories put forth by the weather-prophets. **E. P. CHASE**, of Philadelphia, after a careful examination of the weather records of forty-three years, kept at the Pennsylvania Hospital, five years kept at Girard College, and seventeen years kept by Professor **KIRKPATRICK**, has come to the conclusion that "the position of the moon has a perceptible though slight effect on the weather. In other words, that there is an atmospheric tidal wave produced by the moon which corresponds to the ocean wave." Whether this "slight effect" is unfavorable to vegetation is not known, but as

it must appear in its worst form once every day, the damage is certainly not great.

It is also stated as a scientific fact, that radiation is carried on rapidly on bright moonlight nights; in consequence of which, dew is plentifully deposited on young plants, which conduces to their growth and vigor. This influence, however, can not be very important.

The Italian philosopher, **MELLONI**, has proved, to his own satisfaction, that the rays of the moon do give out a slight degree of heat. But the nicest experiment of other savans have failed to show that the presence and light of the moon are attended by the slightest change of temperature.

Many observations have been made with a view of testing the effect of the changes of the moon on the weather. Professor **PILGRAM**, of Vienna, extended his observations through the long period of fifty-two years; and he found that in a hundred changes at new moon, there were fifty-eight changes of weather, while in forty-two it was settled; at the full, there were sixty-three changes, and thirty-seven settled; the same also at the quarters. Dr. **HORSELEY** made observations with very similar results.

The late Mr. **MERRIAM**, of New York, who watched the weather very closely, and made more observations for over thirty years than probably any other man, declared that in all his experience he was never able to perceive that the moon has the least influence upon the weather.

And yet, to what multitudes in this enlightened age and country, is this rank heresy? How many run to the almanacs to see when the moon is "new," when it "quarters," and when it is "full," and predict changes in the weather at these points. The fact is, the moon is new, or quarters, or is full, once a week, the year round; and in our American climate, the weather changes often—as often as once a week, when it does not remain unaltered for weeks; and so if a change in the weather takes place anywhere near the change in the moon, she is vulgarly referred to as the author of the change. Even educated men will sometimes cling to this notion, and instil it into the minds of their children. The number and variety of superstitions which still linger and burrow in the world, is far larger than most people suppose.

Rainy Days in a Year.—In general, the number of rainy days is the greatest near the sea, and decreases the farther we penetrate into the interior. On the eastern side of Ireland it

rains two hundred and eight days during the year; in the Netherlands, one hundred and seventy; in England, France, and the North of Germany, and in the Gulf of Finland, from one hundred and fifty-two to one hundred and fifty-five days; while on the plains of Volga, at Kasan, it rains on ninety days, and in the interior of Siberia, only on sixty days in the year. In Western Europe it rains on twice as many days as in Eastern Europe; in Ireland, on three times as many days as in Italy and South of Spain. Along the line of the Tropic of Cancer is a belt where rain is almost unknown, including a part of northern Mexico, the desert of Sahara in Africa, and a region of country in Asia extending from Arabia to China. The other extreme is found just above the equator, where there is a belt around the globe of almost constant rain. This includes Panama.

The Farmer's Barometer.—Take a common glass pickle bottle, wide-mouthed; fill it within three inches of the top with water; then take a common Florence flask—a narrow-necked wine bottle—invert it and plunge the neck of the flask into the bottle as far as it will go, and the barometer is complete. In fine weather, the water will rise into the neck of the flask even higher than the mouth of the pickle bottle; and, in wet, windy weather, it will fall to within an inch of the mouth of the flask. Before a heavy gale of wind, the water has been seen to leave the flask altogether, at least eight hours before the gale came to its height.

Leech Barometer.—Take an eight-ounce phial and put it in three gills of water, and place in it a healthy leech, changing the water in Summer once a week, and in Winter once in a fortnight, and it will most accurately prognosticate the weather. If the weather is to be fine, the leech lies motionless at the bottom of the glass, and coiled together in a spiral form; if rain may be expected, it will creep up to the top of its lodgings and remain there till the weather is settled; if we are to have wind, it will move through its habitation with amazing swiftness, and seldom goes to rest till it begins to blow hard; if a remarkable storm of thunder and rain is to succeed, it will lodge for some days before almost continually out of the water, and discover great uneasiness in violent throes and convulsive-like motions; in frosty, as in clear Summer-like weather, it lies constantly at the bottom; and in snow, as in rainy weather, it pitches its dwelling in the very mouth of the

phial. The top should be covered over with a piece of muslin.

Weather Signs.—By the common consent of all civilized people, the state of the weather is one of the primary topics of conversation. It is considered as always in order to allude to the disagreeable weather of yesterday, or the propitious skies of to-day. So universal indeed is this custom of appealing to the elements, that it has come to be widely used as a familiar salutation; until the assertion that it is “a pleasant day,” does not necessarily convey to the mind of the hearer any definite comment upon the condition of the atmosphere. In most cases, the formula merely indicates the state of the speaker's mind. It is a popular demulcent—a medium in which is conveyed from friend to friend the politeness of common life.

If we could look a little farther into this meteorological millstone, our dialogues about the weather might become significant. If, for instance, when we meet upon the sidewalk, and have nothing else to say, we could congratulate each other that to-morrow morning there would certainly be excellent skating; or, if during an awkward chasm in the talk at an evening party on Monday night, we could consult some infallible “weather record for the week,” and make our appointments for a ride on Wednesday morning at nine, to meet our friends at the lake; and a walk for Thursday afternoon at three, to return at six and miss the thunder-storm due over our village at that hour! Here, indeed, would be pleasure and profit in turning to the weather as a topic of talk. And why may not science sometime bring to the world this knowledge of its physical forces?

Meteorology is yet in its infancy, and the ignorant know almost as much of next week's weather as the learned. On this subject we can all be oracular; none of us can be wise. “It will be fair weather to-day, for the sky is red,” is an indication generally trusted in all nations—but where is the guide for to-morrow? The Pharisees were reminded that they could “discern the face of the sky,” but could not discern “the signs of the times.” If the facts were known more definitely, it would probably appear that they could discern the face of the sky about as much to the purpose as the almanac-makers who warn us to “look—for-rain—about—these—days.”

There are undoubtedly many weather signs that may be trusted for the general guidance;

but these are mixed in the popular mind with a thousand others which are the offspring of fancy or superstition, and no scientific observer has yet succeeded in eliminating the worthless ones, and reducing the trustworthy ones to an intelligible system. The science of physical geography, comparatively new, will doubtless undertake this task with success.

Some of the familiar warnings of rain have been thrown into rhyme by Dr. JENNER, and given by him as an excuse for not accepting an invitation to dinner:

"The hollow winds begin to blow,
The clouds look black, the glass is low,
The soot falls down, the spaniels sleep,
And spiders from their cobwebs creep.
Last night the sun went pale to bed,
The moon in halos hid her head,
The boding shepherd heaves a sigh,
For see! a rainbow spans the sky.
The walls are damp, the ditches smell;
Closed is the blue-eyed pimpernel.

"Hark! how the chairs and tables crack;
Old Betty's joints are on the rack;
Her corns with shooting pains torment her,
And to her bed untimely send her.
The smoke from chimneys right ascends,
Then spreading, back to earth it bends.
The wind, unsteady, veers around,
And settling in the south is found.

"Loud quack the ducks, the peacocks cry,
The distant hills are low and nigh.
How restless are the snorting swine;
The busy flies disturb the kine.
Low o'er the grass the swallow wings,
The cricket, too, how loud it sings!
Puss on the hearth, with velvet paws,
Sits smoothing o'er her whiskered jaws.
Through the clear stream the fishes rise,
And nimbly catch the incautious flies;
The sheep were seen at early light,
Cropping the meads with eager bite.

"Though June, the air is cold and chill;
The mellow blackbird's voice is still.
The glow-worms, numerous and bright,
Illumined the dewy dell last night;
At dusk, the squalid toad was seen,
Hopping and crawling o'er the green.
The frog has lost his yellow vest,
And in a dingy suit is dressed.
The leech, disturbed, is newly risen,
Quite to the summit of his prison.

"The whirling wind the dust obeys,
And in the rapid eddy plays;
My dog, so altered in his taste,
Quits mutton-bones, on grass to feast;
And yonder rooks, how odd their flight!
They imitate the gliding kite,
Or seem precipitate to fall,
As if they felt the piercing ball.
'T will surely rain; I see, with sorrow,
Our jaunt must be put off to-morrow."

There is a tradition that the next day was unusually fair, and that the poetical doctor stayed at home pondering on the fallibility of human prophecy.

We add some rules, many of them reasonable and others, probably, fanciful, compiled to suit all weathers:

For Fine and Dry Weather of Long Continuance.—If the wind be north, northwest, or east, then veer to the northeast, remain there two or three days without rain, and then veer to the south without rain, and if thence it change quickly, though perhaps with a little rain, to the northeast and remain there—such fine weather will last occasionally for two months.

If spiders, in spinning their webs, make the terminating filaments long, we may, in proportion to their length, conclude that the weather will be serene, and continue so for ten or twelve days.

Spiders generally alter their webs once in twenty-four hours; if they do this between six and seven in the evening, there will be a fine night; if they alter their web in the morning, a fine day; if they work during rain, expect fine weather; and the more active and busy the spider is, the finer will be the weather.

If near the full moon there be a general mist before sunrise; or

If there be a sheep-sky, or white clouds driving to the northwest, it will be fine for some days. Also if there be a heavy dew.

For Fine Weather of Shorter Duration.—If at sunrise many clouds are seen in the West, and then disappear.

If, before sunrise, the fields be covered with a mist.

If the clouds at sunrise fly to the West.

If at sunrise the sun be surrounded by an iris, or circle of white clouds.

If there be red clouds in the West at sunset it will be fine; if they have a tint of purple it will be very fine; or if red, bordered with black, in the southeast.

If there be a ring or halo round the sun in bad weather.

If the full moon rise clear.

If there be clouds in the East in the evening.

If the wind change from southeast, south, or southwest, through the west to the north, without storm or rain.

If there be a change of damp air into cloudy patches, which get thinner.

If a layer of thin clouds drive up from the northwest under other higher clouds driving more south.

If many gnats are seen in Spring, expect a warm Autumn.

If gnats fly in compact bodies in the beams of the setting sun there will be fine weather.

If spiders work in the morning early at their webs, there will be a fine day.

If bats flutter and beetles fly about, there will be a fine morrow.

If there be lightning without thunder, after a clear day, their will be a continuance of fair weather.

If the mists vanish rapidly, and do not settle upon the hills.

If a north wind remain steady for two or three days.

If it rain before sunrise, there will be a fine afternoon.

If a white mist, or dew, form in the evening near a river, and spread over the adjoining land, there will be fine weather.

If in the morning a mist rise from over low lands, it will be fine that day.

For Continued Showers.—If the garden spiders break and destroy their webs and creep away.

If there be, within four, five, or six days, two or three changes of the wind from the north through the west to the south, without much rain and wind; and thence again through the west to the north with rain and wind, expect continued showery weather.

For Foul or Wet Weather.—If the sun rise pale, or pale red, or even dark blue, there will be rain during the day.

If the clouds at sunrise be red, there will be rain the following day.

If the sun rise covered with a dark spotted cloud; rain the same day.

If the sun set in dark, heavy clouds, rain next day.

If the sun set pale or purple, rain or wind the following day.

If at sunset there be a very red sky in the east, wind; if in the southeast, rain.

If there be many falling stars on a clear evening in the summer, thunder.

If the sun burn and carry a halo during fine weather, wet.

If it rain and the sun shine, frequent showers.

If the full moon rise pale, wet.

If the full moon rise red, wind.

If the stars appear large and flicker, rain or wind.

A fleecy sky, unless driving northwest, indicates wet.

If clouds at different heights float in different directions.

If clouds at the same height drive up with the wind, and gradually become thinner, and descend.

If clouds form high in air, in thin white trains like locks of wool, they portend wind, and probably rain. When a general cloudiness covers the sky, and small black fragments of clouds fly underneath, they are a sure sign of rain, and probably it will be lasting. Two currents of clouds always portend rain, and, in Summer, thunder.

If their forms are soft, undefined, and feathery, the weather will be fine; if the edges are hard, sharp, and definite, it will be foul. Generally speaking, any deep, unusual lines betoken wind or rain.

If there be rain about two hours after sunrise, it will be followed by showers.

If there be a damp fog or mist, accompanied with wind; wet.

If there be a halo round the moon, in fine weather; and the larger the circle, the nearer the rain.

If the fields in the morning be covered with a heavy, wet fog, it will generally rain within two or three days.

"A rainbow in the morning is the shepherd's warning."

If the leaves of the trees move without any perceptible wind, rain may be expected.

If there be a west and southwest wind in July and December, much rain.

If there be a north wind in April; rain.

If there be an abundance of hoar-frost; rain.

If there be in May a southwest wind; genial showers.

If mists rise and settle on the hill-tops; rain.

If the sky, after fine weather, becomes wavy, with small clouds; rain.

If, in Winter, the clouds appear fleecy, with a very blue sky, expect snow or cold rain.

If the wind blow, between north and east, or east, with clouds, for some days, and if clouds be then seen driving from the south, high up, rain will follow plentifully, sometimes forty-eight hours afterward. If, after or during the rain, the wind goes to the south or southwest; better weather.

If there be a continuance of rain from the south, it will be scarcely ever succeeded by settled weather before the wind changes, either to the west or to some point of the north.

If rain fall during an east wind, it may be expected to last twenty-four hours.

If old and rheumatic people complain of their corns and joints, and limbs once broken ache at the place of their union.

If the smoke from chimneys blow down; or

if soot take fire more readily than usual, or fall down the chimney into the grate; *expect rain.*

If the marigold continue shut after seven in the evening; *rain.*

If the convolvulus and chickweed close, there will be rain.

If asses shake their ears, bray, and rub against walls or trees.

If cattle leave off feeding, and chase each other in their pastures.

If cats lick their bodies and wash their faces.

If foxes and dogs howl and bark more than usual; if dogs grow sleepy and dull; also, if they eat grass.

If swine be restless, and grunt loudly; if they squeak and jerk up their heads, there will be much wind; whence the proverb—"Pigs can see the wind."

If moles cast up hills; *rain*; if through openings in the frozen turf, or through a thin covering of snow, a change to open weather may be expected.

If horses stretch out their necks, and sniff the air, and assemble in the corner of a field, with their heads to leeward; *rain.*

If peacocks and guinea-fowls scream, and turkeys gobble; and if quails make more noise than usual.

If sea-birds fly toward land, and land-birds to sea.

If the cock crow more than usual, and earlier.

If swallows fly lower than usual.

If the crow makes a great deal of noise and flies round and round.

If birds in general pick their feathers, wash themselves, and fly to their nests.

If bees remain in their hives, or fly but a short distance from them.

If fish bite more readily, and gambol near the surface of the streams or ponds.

If gnats, flies, etc., bite sharper than usual.

If worms creep out of the ground in great numbers.

If frogs and toads croak more than usual.

If the sun be seen double, or more times reflected in the clouds, expect a heavy storm.

If the odor of flowers be unusually penetrating, and the sound of distant bells and railway trains plainer than usual.

If a pig carries straw in its mouth.

For Frost.—If the wind shift from south to southeast in Winter.

If birds of passage arrive early in the Fall from colder climates.

If the cold increase while it snows.

If the ice crack much, expect colder weather.

If the mole dig his hole two feet and a half deep, expect a *very severe Winter*; if one foot deep a mild Winter.

If water-fowl or sparrows make more noise than usual; also, if robins approach nearer houses than usual; *frost.*

If there be a dark gray sky, with a south wind.

If there be continued fogs.

If the fire burn unusually fierce and bright in Winter, there will be frost and clear weather; if the fire burn dull, expect damp and rain.

It seldom freezes with a west wind; not much with a north.

Weather Days.—The last three days of February are said to be the indicators for the three Spring months respectively—as the wind is on those respective days, so will be the prevailing winds of the months to which they refer.

If the first day of March is pleasant, the closing part of the month will be rough and stormy; and if the first day is stormy, the close of the month will be pleasant.

The three days of the Spring equinox—March 20—are held to indicate respectively the character of the Spring and season—if the prevailing wind should be north or northwest, look out for a cold season; if in the south expect mild and growing weather.

The Wonders of Natural History.

The researches of naturalists are day by day adding to our stock of reliable information on the interesting subject of the numbers, varieties, and economy of the animal creation. RAY, who wrote in 1690, set down the number of *beasts*, as he called them, including *serpents*, at 150; saying, "not many of any considerable bigness in the known regions of the world had escaped the cognizance of the curious." BUFFON said at a later date, "All the four-footed animals may be reduced to 250 pairs, and the birds to a still smaller number." Instead of the 150 of RAY, we have over 1,500; and the 500 of BUFFON exceed 9,500 individual species, over 8,000 being birds.

Of reptiles, there are about 1,500 already known. Neither toads, snakes, nor ophidian reptiles of any kind are found, it is said, in Ireland.

Fishes are much more numerous in varieties than any other vertebrate animal, exceeding ten thousand.

Of the invertebrate, the varieties are almost countless. In one class of these, the insects,

more than 100,000 species have been preserved in cabinets, and more than 200,000 are known to naturalists. The actual number, probably, exceeds half a million!

Besides these, we have the molluscan classes, shell fish, cuttle fish, snails, etc.; the articulated, such as leeches, lobsters, crabs, earth worms, and the like; the radiata, such as the starfish, polypi, coral, madrepores, sponges, etc.

How creation expands upon intelligent research! Whether viewed by the telescope or microscope, we behold increasing worlds beyond our natural vision. The former brings successive strata of nebulae to view, each formed of myriads of distant suns, the probable centers of systems like our own; the latter finds successive myriads of insects, constantly decreasing in magnitude. How innumerable the yet unexplored varieties of these may prove, future naturalists may approximately determine, but we can hardly appreciate.

Age of Animals.—A bear rarely exceeds 20 years; a dog lives 20 years; a fox, 14 or 15; lions are long-lived—Pompey lived to the age of 70; the average of cats is 14 years; squirrels and hares 7 or 8 years; rabbits 7. Elephants have been known to live to the great age of 400 years. When ALEXANDER the Great had conquered PORUS, king of India, he took a great elephant, which had fought very valiantly for the king, named him Ajax, dedicated him to the sun, and let him go, with this inscription, "ALEXANDER, the son of JUPITER, has dedicated Ajax to the sun." This elephant was found 354 years after. Pigs have been known to live to the age of 30 years; the rhinoceros to 20; a horse has been known to live to the age of 62, but averages 20 to 25 years; camels sometimes live to the age of 100 years; stags are long-lived; sheep seldom exceed the age of 10; cows live 18 years. CUVIER considers it probable that whales sometimes live to the age of 1000 years. Dolphins and porpoises attain the age of 30. An eagle died at Vienna at the age of 104. Ravens have frequently reached the age of 100. Swans have been known to live 360 years. Pelicans are long-lived. A tortoise has been known to live to the age of 107 years.

Vegetable Reproduction.—Plants have male and female organs of generation, which may be observed by the naked eye. The pollen is prepared and preserved in certain vessels called anthers. Its finest part penetrates through the stigma, an opening in the female part, through the pistil to the ovary and fructifies the eggs lying there. With most plants, both sexes are

united in one flower; with a few they are separated. The former are called perfect flowers; the latter male and female. The two latter either stand on one stem or belong to different plants. Where the two sexes are entirely separated, fructification takes place only when the two plants, of different sexes, stand near enough for the male pollen to be carried to the female by the wind or by insects. If this or artificial fructification does not take place, the germ either falls off or it forms a fruit which is incapable of germinating.

Wonderful, indeed, are the means by which nature effects the fructification of these plants! Within the flower are generally glands which exude a honey attractive to insects; but, in order to obtain this, they must powder themselves in the male flowers with the pollen. Visiting, afterward, a female flower with the same object, they must deposit the pollen on the pistil. In some other plants, where the male and female parts in perfect flowers are so placed as not to be able to reach each other, little flies are attracted by the honey, but immediately upon their entrance the flower closes, and the imprisoned insects crawling about are forced to fructify it before they are released!

A Vegetable Animal.—The boundary line between the vegetable and animal kingdoms, is quite as indistinct and doubtful as that between the mineral and vegetable; and the most learned in natural history find it difficult to define an animal, and to draw the scientific line of demarcation which shall be sufficiently comprehensive and, at the same time, sufficiently exclusive. Like animals, plants have the power of contraction, irritability, the power of formation, the power of reproducing their species through organs somewhat similar, the power of sleep, the power of turning to the light, the power of breathing, and the power of seeking, selecting, and receiving nutrition. Some of them seem also to have the power of sensation, and of limited motion. Certain species of plants seem to have almost as much voluntary motion as the lowest order of animals.

The sponge has firm roots and was formerly supposed to be a vegetable; then it was believed to be a vegetable at first, and afterward an animal; now it is known to be an animal. Indeed, the French government is making an effort to acclimate sponges in its own waters. The sponge business has become a prominent department of industry in the Bahama Islands. It is almost entirely the growth of the last twenty years, and nets annu-

ally about twenty thousand dollars. The sponge is fished and raked from the sandy bottom of the ocean, at the depth of twenty, forty, or sixty feet. It belongs to a very low order of animal life, organization hardly being detected. It is said to be covered in its living state with a kind of semi-fluid thin coat of animal jelly, susceptible of a slight contraction or trembling on being touched; which is the only symptom of vitality displayed by the sponge. When first taken from the water it is black, and becomes exceedingly offensive from decomposition. It is so poisonous in this condition that it almost blisters the flesh it happens to touch. The first process is to bury it in the sand, where it remains for two or three weeks, in which time the gelatinous animal matter is absorbed and destroyed by the insects that swarm in the sand. After being cleansed, it is compressed and packed in bales like cotton.

A marvelous instance of the apparent combination of the animal and vegetable, is that said to exist in the insect *cigara* in Brazil, the large tree, *japecarga*, sometimes growing upright out of its body. The *cigara* makes an incessant chirping on the tree, and, as the saying is, chirps till he bursts and falls to the ground. A young *japecarga* then sprouts and grows out of its back, the roots seeking contact with the earth by growing down its legs. Reliable travelers vouch for this circumstance. The explanation is that the insect feeds upon the *japecarga* seeds, which, under favorable circumstances, germinate and cause the death of the insect, the germ shooting up through the softest part, and sending rootlets down the only outlets, the legs.

Animalcule.—If some hay be placed in a glass of rain-water, and allowed to soak for a few days in a sunny place, and if it be then removed, the water will be found, under a powerful microscope, to contain many very small moving animalcule, which are also called infusoria, from their being produced after infusing the hay.

These microscopical beings are also developed in milk, urine, vinegar, and many other fluids, after standing a while. Dip the point of a pin in blood, and the small drop thus taken will contain an active, living, moving population of three millions of beings. It has been calculated by men who have demonstrated the foregoing facts, that twenty millions of these animate beings are formed, live, and perish in a single person in a few moments of time, or perhaps in a single pulsation of the

heart. Can you realize that you have dancing, swimming, and frolicking, beings within you, in numbers almost infinitely beyond the human population of the globe? Yet such is the fact.

Dr. EHRENBURG demonstrates that the smallest forms of animalcules, called monads, are colorless and transparent as crystal, having as perfect an organization as is possessed by much larger creatures. The parent spontaneously divides itself into two or more parts, and these parts become parents by their spontaneous divisions, and so they continue to multiply after their origin is perfected. These little fellows form the limit of our acquaintance with animated nature. The End Monad must be magnified one hundred and sixty thousand times in surface before it can be seen. Make an infusion of spider-wort, and they will spring into being on its surface in such numbers, that many millions may be taken up on the head of a pin, or you may put two hundred and twenty billions into an ordinary thimble.

One would hardly suppose their little bodies could evolve thoughts, or manifest instinct or sagacity. Dr. THOMAS DICK informs us that Mr. BAKER put some hair-like animalcules into a jar of water; one part went to the bottom, while the other part floated on the top. They grew weary of camp life and determined to march. Both armies set out at the same time. As their advancing columns approached each other, the ascending army opened to the right and left, and continuing on in two columns, completely flanked the position evacuated at the top; while the descending column passed through, proceeding majestically to the bottom in as perfect order as though marshaled by the greatest military genius of the age. These wonderful creatures have been confined in minute drops of water and between two concave glasses, when they evinced the greatest uneasiness and desire to escape, searching from point to point, and carefully examining every apparent opening.

The shape of animalcule is infinitely diversified—one is a long slender eel, another is coiled up like a serpent; some are circular, elliptical, or globular; others resemble a triangle or a cylinder; others, still, a tunnel or a bell. Their motions are equally remarkable. Several species chiefly stand upon their heads and gyrate like a top! Others progress by leaps or somersaults; some swim with the velocity of an arrow; some drag their bodies like sloths; others seem not to move at all. Many species prey upon each other.

Toads.—In consequence of the instinctive appetite of the toad for living insects, a rapid digestion and capacious membranous stomach capable of remarkable distention, toads are incalculably useful to the gardener, by protecting his under vines from the nocturnal depredators. Both toads and frogs catch their own prey with the point of their tongue. It is a marvelously-constructed organ—occupying but little room at the end of the gullet—appearing like a small fleshy eminence on prying open the jaws; it is singularly elastic, and may be projected at the pleasure of the animal, six or eight inches, and perhaps more. The projectile force is exerted with the quickness of a flash of light. An extremely tenacious secretion exudes from it so sticky that the slightest touch with the object at which it is thrust holds it firmly; and the contraction of the fibers instantly delivers the struggling captive exactly at the opening of the fauces, where it is taken off, as our teeth detach a morsel from the tines of a fork. No wonder, then, that gardeners about Paris buy toads and pay a given sum per dozen, as they do, to put in their gardens. The French people were the first to learn and proclaim the great utility of birds to both farmers and gardeners, and to advocate their protection against sportsmen, who too often shoot them merely to gratify a love of what they call sport.

Ants as Food.—The Africans eat ants stewed in butter. The Swedes distil them with rye, to give a peculiar flavor to brandy. Pressed ant eggs yield a mixture resembling chocolate with milk, of which the chemical composition resembles ordinary milk. The large termites, or white ants, which are so destructive to houses and furniture, are roasted by the Africans in iron pots, and eaten by the handfals as sugar-plums. They are said to be very nourishing, and taste like sugared cream, or sweet almond paste. As for locusts, the Africans, according to Dr. PHIPSON, far from dreading their invasions, look upon a dense cloud of locusts as we should upon so much bread and butter in the air. They smoke them, or boil them, or stew them, or grind them down as corn, or salt them, and get fat on them.

Ants as Slave-Holders.—It is a remarkable fact in natural history, to which there is no other at all analagous, that the Amazon ant is a slave-holder; and the circumstance may be thought still more curious, that these kidnappers are red or pale colored, while the ants they subject to bondage are jet black. The Amazon

ant is not furnished with jaws capable of performing the work that usually falls to the lot of neuters, or enslaved ants; but the length and sharpness of the mandibles which unfit it for work, render it eminently capable of warfare. Hence an army of Amazons set off in martial array on a slave-hunting expedition; the vanguard, which consists of eight or ten only, continually changing. On arriving at the nest of the negro ants, a desperate conflict ensues, which ends in the defeat of the blacks; when the conquerors tear open the now defenceless ant-hills with their powerful mandibles, and bear away in their jaws large numbers of the unconscious young. When these pupæ are hatched into insects of the helot or worker class, they immediately take on themselves the menial labors of the nest.

The Amazon ant seems to be utterly incapable of work; and, in one instance, a number of them were confined in a glass case, together with some pupæ, and were not only unable to rear the young, but could not even feed themselves, so that the greater number died from hunger. At this juncture a single slave ant was introduced into the case, which at once undertook the whole care of the family, fed the still living Amazon ants, and took charge of the pupæ until they were developed into perfect insects. The labors of these little slaves do not seem to be arbitrarily forced on them, but they engage in them from instinct, and do not realize their slavery any more than dogs, horses, or cattle do, who have never enjoyed freedom.

Amusements, Puzzles, Etc.—We have tried to group under this head a choice selection of those simple amusements which may assist intelligent people to a pleasant evening's entertainment.

The Piano Kaleidoscope.—This is one of the prettiest surprises imaginable. Any lady, with a particle of ingenuity, by following these simple directions, can transform an ordinary-shaped piano-forte into a mammoth kaleidoscope, much superior, in all respects, and not the least on account of its novelty, to the toy of that name, invented by Sir DAVID BREWSTER:

The front portion of the top of the piano is turned back on its hinges over the main portion, to an angle of sixty degrees or less, and supported in that position by placing behind it a book, or other suitable prop; and the cloth cover is then placed over the whole of the top which is thus thrown back, in such manner as

close the opening behind it. A triangular tube of the whole length of the piano is thus formed, the portions of the top forming the bottom and front sides and the cloth cover forming the third or rear side of the tube. The polished surfaces form the reflectors of the kaleidoscope. A small table or any other convenient stand is placed close to one end of the piano, and two candles or small lamps are placed upon it, one on each side of the mouth of the tube, in such positions that their lights are not visible through the opposite end of the tube. Any article having any gay colored figures upon it, such as a piece of carpet, a shawl, a quilt, a piece of colored embroidery, or a bunch of bright-colored ribbons, is then held up near the lights, in such manner that they shine upon that side of it which is toward the tube, and is moved about in as great a variety of directions as possible; and a person looking through the tube from the opposite end will see an almost infinite variety of beautiful figures, such as are seen through an ordinary kaleidoscope, only on a very much larger scale. The exhibition may be amusingly varied by a person presenting his face to the lights and moving his head about and grimacing, or by two or three persons moving their hands and fingers at the lighted end of the tube. Almost any article or object moved about at the lighted end of the tube will produce an effect which, if it be not positively beautiful, will be, at least, very grotesque or amusing.

It might be supposed that only a new or newly-polished piano would be suitable for this exhibition, but even with an old instrument, on which the polish has lost much of its brilliancy, a very beautiful exhibition may be obtained.

The entertainment may be enlivened by the playing of the piano during the exhibition, and moving the object in time with the music. The astonishment of the spectators will be increased if they be shut into an adjoining room, and permitted to look into the end of the piano between the folding-doors, slightly ajar, all the machinery of the exhibition being skillfully concealed from them.

The Æolian Harp.—An excellent æolian harp can be made by observing these directions: Procure a *white-pine* board, say six inches wide and half an inch thick—(must be planed). Let the length be governed by the width of the window in which it is to play, making it to slip in easily. Next make the bridges out of the same thickness of stuff. Let them be about

seven inches long, two inches wide at one end and half an inch at the other. Now divide each end of your board with a saw into eleven or twelve equal parts, placing a tack at each division on the *under* side. Procure common sewing-silk (spool silk) and let the first string be composed of but one strand, the second two, the third three, and so on up to the eleventh or twelfth string, which should be composed of as many strands. Twist the silk well together, and let them be thoroughly waxed. Tie the strings to the tacks, drawing them tight. Now take your bridges, and having slipped them between the board and strings, draw them gradually to the extremities of your board, and you will have a harp which will give satisfaction.

To apply it to the window let it rest upon the sill, half in and half out, keeping it level by placing small blocks or feet upon the under side. Draw the window down to within an inch of the top string, and create a draft by opening an opposite door or window. We have tried all sorts of wood, and all shapes, for these harps, and find nothing equal to the above.

Charades.—There is nothing pleasanter for a part of an evening's entertainment than acted charades. They are growing more and more fashionable, and there is no obstacle to their becoming entirely popular with all classes, except the fact that there are so few in any party who feel themselves capable of officiating successfully as the *dramatis personæ*. Out of every ten persons there are five who could, if they would, present charades in good style; there is less lack of ability than lack of confidence. No genius is necessary; the chief requisites are amiability, a glibness of tongue, and an unconsciousness of the presence of an audience.

A charade, we need hardly explain, is an enigma based upon a word, whose syllables may be represented in different acts. There is usually in a charade one act for every syllable, and one for the whole word. The actors are expected to turn their conversation and acting in the direction of the syllable in hand, so as to suggest it to the company if they be ingenious. Puns on syllables are, of course, allowable; indeed, these furnish the chief source of amusement. To be efficient in charades is quite an accomplishment; the young should practice, for they may thus, with little trouble and no expense, be enabled to contribute much to the enjoyment of their companions. We append a table of words that admit of being

acted in charades—the representation being generally based upon the *sound* of the syllables, rather than upon their orthography :

Dog-ma.	Car-ri-age.
Pul-pit.	A-meri-ca.
Pat-riot-tic.	(A-merry-key.)
Brig-a-dier.	Band-box.
Sent-i-ment.	Bar-ba-cue.
Knight-hood.	In-no-cent.
Mor-ti-fy.	Cat-a-logue.
Tree-son-able.	Captive-i-ty (tea.)
Incom-pair-ible.	Mas-quer (cur)-ade.
Ad-mir-able.	Incom-pat-ible.
Bag-dad.	Hand-ker-chief.
In-tel-li-gent.	Back-bite-ers.
Miss-under-stand.	Charity (Chair-i-tie.)
Imp-penny-tent.	Mai-den-aunt.
Con-temple-ate.	Dram-ated.

Indeed, a large proportion of the words in the dictionary will admit of being charades, by ingenious actors before an intelligent, discerning company. For such a party there is no way to spend an occasional evening more entertaining or more improving than to recruit a company for impromptu charades.

Anagrams are formed by the transpositions of the letters of words or sentences, or names of persons, so as to produce a word, sentence, or verse of pertinent, or of widely-different meaning. They are very difficult to discover, but are exceedingly striking when good. The following are some of the most remarkable :

<i>Transposed</i>	<i>Forme—</i>
Astronomers	No more stars.
Catalogues	Got as a clue.
Elegant	Neat leg.
Impatient	Tim in a pet.
Immediately	I met my Delia.
Masquerade	Queen as mad.
Matrimony	Into my arm.
Melodrama	Made moral.
Midshipman	Mind his map.
Old England	Golden land.
Parishioners	I hire parsons.
Parliament	Partial men.
Penitentiary	Nay I repent.
Presbyterians	Best in prayer.
Radical Reform	Rare mad frolic.
Revolution	To love ruin.
Sir Robert Peel	Terrible poser.
Sweetheart	There we sat.
Telegraphs	Great helps.

How to Learn a Lady's Age.—The following table will help you. Just hand the table to

the lady, and ask her to tell in which of its columns her age is contained. Then add together the figures at the top of the columns designated, and you have the great secret. Suppose an age to be seventeen. You will find the number seventeen only in two columns, viz.: the first and fifth; and the first figures at the head of these columns make seventeen. Here is the magic table :

First.	Second.	Third.	Fourth.	Fifth.	Sixth.
1	2	4	8	16	32
3	3	5	9	17	33
5	6	6	10	18	34
7	7	7	11	19	35
9	10	12	12	20	36
11	11	13	13	21	37
13	14	14	14	22	38
15	15	15	15	23	39
17	18	20	24	24	40
19	19	21	25	25	41
21	22	22	26	26	42
23	23	23	27	27	43
25	26	28	28	28	44
27	27	29	29	29	45
29	30	30	30	30	46
31	31	31	31	31	47
33	34	36	40	48	48
35	35	37	41	49	49
37	38	38	42	50	50
39	39	39	43	51	51
41	42	44	44	52	52
43	43	45	45	53	53
45	46	46	46	54	54
47	47	47	47	55	55
49	50	52	56	56	56
51	51	53	57	57	57
53	54	54	58	58	58
55	55	55	59	59	59
57	58	60	60	60	60
59	59	61	61	61	61
61	62	62	62	62	62
63	63	63	63	63	63

Ocular Illusion.—Here is a row of ordinary letters and figures,

s s s s x x x x z z z z 3 3 3 3 8 8 8 8

They are such as are made up of two parts of similar shapes. Look carefully at these, and you will perceive that the upper halves of the characters are a *very little* smaller than the lower halves—so little that an ordinary eye will declare them to be of equal size. Now turn the page upside down, and, without any careful looking, you will see that this difference in size is very much exaggerated—that the real top of the letter is very much smaller than the bottom half—a curious example of the inaccuracy of the untrained eye under certain circumstances.

Puzzle.

I am constrained to plant a grove,
To please the lady that I love;
This ample grove is to compose
Nineteen trees in nine straight rows,
And in each row five trees must place
Ere I can hope to see her face;
Ingenious friend, pray lend your aid
To satisfy this curious maid.

Answer.

If you your skill aspire to prove,
To plant the complicated grove,
As a shy maiden did propose,
Of nineteen trees in nine straight rows,
So in each row five trees shall be,
Or her fair face despair to see—
Be guided by the following rule,
And show you are no lady's fool:

Six equidistant points mark round
A circle drawn upon the ground;
Three lines from every point then trace,
To points most distant cross the space;
At every junction plant a tree;
Then pleased this curious maid will be,
Her beauteous face to let you see.

This answer is illustrated in the accompanying cuts. The second engraving exhibits another way to do the same thing.



Ice in a Red-Hot Crucible.—Place a platina crucible over a spirit lamp, and keep it at a red heat; pour in some sulphuric acid, which, though the most volatile of bodies at a common temperature, will be found to be completely fixed in the hot crucible, and not a drop evaporates—being surrounded by an atmosphere of its own, it does not in fact touch the sides. A few drops of water are now introduced, when the acid immediately coming in contact with the heated sides of the crucible, flies off in sulphurous acid vapor, and so rapid is its progress that the caloric of the water passes off with it, which falls into a lump of ice at the bottom;

by taking advantage of the moment, before it is allowed to remelt, it may be turned out a lump of ice from a red-hot vessel.

The Fire-King.—A few years ago, a man who called himself "The Fire-King," went through the country performing to wondering spectators his remarkable feat of walking into a fiery furnace, and emerging unscathed. The experiments of jugglers have proved that, under certain conditions, the hand can be immersed with impunity in melted metal. Little more is required than to rub the hands with soap so as to give them a polished surface, then to plunge them into a cold solution of water and sal-ammoniac, and afterward to put them into a liquid iron, lead, bronze, or other metal, moving them rapidly through it, though not too rapidly. The explanation of this curious fact is this: When the hand is plunged into melted metal the skin is not in contact with the metal, and therefore the heat incident upon the skin can arise only from that which is radiated from the metal. The moisture of the skin passes into the spheroidal state, and reflects the radiating caloric, so that the heat is never at the boiling point.

The Disappearing Dime.—Provide yourself with a piece of India rubber cord about twelve inches long, and a dime with a hole on the edge; attach the dime to the cord with a piece of white sewing silk, and, after having done this, sew the cord to your coat-sleeve lining, but be very careful and ascertain that the end upon which the dime is attached does not extend lower than within two inches of the extreme end of the sleeve when the coat is on. It is better to have the dime in the left arm sleeve. Having done this, bring down the dime with the right hand, and place it between the thumb and the index finger of the left hand, and showing it to the company, tell them that you will give the coin to any one present who will not let it slip away. You must then select one of the audience to whom you proffer the dime, and just as he is about to receive it, you must let it slip from between your fingers, and the contraction of the elastic cord will make the coin disappear up your sleeve, much to the astonishment of the person who thinks he is about to receive it. This feat can be varied by pretending to wrap the coin in a piece of paper, or a handkerchief. Great care should be taken not to let any part of the cord be seen, as this would of course discover the trick. This is one of the most surprising feats of leg-

erdemain, and its chief beauty consists in its extreme simplicity.

To Put an Egg in a Bottle.—Soak the egg in strong vinegar until its shell becomes soft, when it may be extended lengthwise without breaking; then put it through the neck of a small bottle, and by pouring cold water upon it, it will speedily reassume its former figure and hardness. Should the vinegar not be strong enough to soften the shell sufficiently, add a little strong acetic acid. To one not acquainted with this trick, it is inexplicable.

Hold a Red Rose over the blue flame of a common match, and the color will be discharged wherever the fumes touch the leaves of the flower, so as to render them beautifully variegated, or entirely white. If it be then dipped into water, the redness, after a time, will be restored.

Magic Inks.—Dissolve oxide of cobalt in acetic acid, to which add a little niter; write with this solution; hold the writing to the fire, and it will be of a pale rose color, which will again disappear on cooling.

Dissolve equal parts of sulphate of copper and muriate of ammonia in water; write with the solution, and when dry, hold to the fire, the warmth of which will bring out the writing, which will again disappear on becoming cold.

The Lead Tree.—Put in a large pint phial about half an ounce of sugar of lead, and fill it to the bottom of the neck with rain water. Then suspend by a bit of silk fastened to the cork, a piece of zinc wire two or three inches long, so that it may hang nearly in the center. Place the phial where it will not be disturbed, and beautiful branching crystals of lead will form all round the zinc.

The Tin Tree.—This is produced in the same way; only, instead of the sugar of lead, use three drams of muriate of tin and ten drops of nitric acid, and let them dissolve well before you put in the zinc wire. The tin tree is more brilliant than the lead.

The Silver Tree.—Put four drams of nitrate of silver and one ounce of mercury, into a phial of rain water, and suspend the zinc wire; let it remain very quiet. This is sometimes called the tree of Diana. The close affinity, or attraction, between the metals used in these experiments, is the reason they separate from the water, and cling around the wire. Children should be encouraged in making these beautiful experiments.

The Three Jealous Husbands.—Three jealous husbands with their wives, having to cross a small stream, find a boat without an owner, which is only large enough to carry two persons at a time. Wanted to know—how the six persons can transport themselves over the river in pairs, so that no woman shall be left in company with any of the men, unless her husband be present.

Answer.—At first two wives cross the river, then one returns and takes over the remaining wife, after which she recrosses and stays with her husband, and the other two husbands cross over to their wives. Then a husband and wife come back, and the two husbands cross. Then the wife returns and takes over one of the others, and, lastly, the husband of the remaining one comes back for his wife. This may be demonstrated with checkers of two colors.

To Find the Quotient.—It is required to name the quotient of five or three lines of figures—each line consisting of five or more figures—only seeing the first line, before the other lines are even put down. Any person may write down the first line of figures for you. How do you find the quotient?

Answer.—When the first line of figures is set down, subtract 2 from the last right-hand figure, and place it before the first figure of the line, and that is the quotient for five lines. For example, suppose the figures given are 86,214, the quotient will be 286,212. You may allow any person to put down the two first and the fourth lines, but you must always set down the third and fifth lines, and in doing so always make up 9 with the line above, as in the following example:

Therefore in the annexed diagram

86,214	you will see that you have made 9
42,680	in the third and fifth lines with the
57,319	lines above them. If the person
62,854	desired to put down the figure,
37,145	should set a 1 or 0 for the last
—	figure, you must say we will have
Qt. 286,212	another figure, and another, and
	so on until he sets down something
	above 1 or 2.

In solving the puzzle with three lines, you subtract 1 from the last figure and place it before the first figure, and make up the third line yourself to 9. For example: 67,856 is given, and the quotient will be 167,855, as shown in the above diagram.

67,856	
47,218	
52,781	
—	
Qt 167,855	

To Tell Any Number Thought Of.—This is a very ingenious puzzle, and causes much astonishment until its method is discovered. Ask a person to think of a number; then tell him to subtract 1 from that number; now tell him to multiply the remainder by 2; then request him again to subtract 1, and add to the remainder the number he first thought of and to inform you of the total. When he has done this, you must mentally add 3 to that total, and then divide it by 3, and the quotient will be the number first thought of. We present an example of this puzzle, which will render the method plain and show the reason of the result.

18 for \$1, and two for \$1—FIVE for \$2. Can our
1 readers account for the deficiency of \$1 on the
second sale?

— *Answer.*—The solution of the problem of the geese is very simple. It is true that the buyer of the geese from A, at two for \$2, and from B at three for \$1, obtains five for \$2. But when B has sold all of his geese, having received \$10 for his 30, A has only sold 20 for the same money, and has 10 left at the rate of two for \$1. Thus, when A has sold only 20, the rate of five for \$2 ceases; being two for \$1, or four for \$2, for the remaining ten belonging to A. Therefore this accounts for the difference of \$1 between the two sales.

— *How Much is a Billion?*—Do you know how many things it takes to make a billion? A million of millions, by English enumeration, any schoolboy will tell you. But does that same schoolboy know that, if he could count for twelve hours every day, at the rate of 200 a minute, it would take him 19,025 years? A quadrillion is a billion of billions, and can be easily represented thus: 1,000,000,000,000,000,000,000. But to count a quadrillion at the above rate, would take all the inhabitants of the globe to count incessantly for 19,025,875 years!

These large numbers are of little practical use, and have their chief place in the fancy of arithmeticians.

Curious Properties of the Figure Nine.—The figure 9, in its combination with other figures, possesses properties which may well cause amazement, and would excite awe if mathematicians were ever superstitious. Thus:

Any number multiplied by 9 produces a sum of figures which, added together, continually make 9 or its multiple. For example, all the first multiples of 9, as 18, 27, 36, 45, 54, 63, 72, 81, sum up 9 each. Each of them, multiplied by any number whatever, produces a similar result; as 8 times 81 are 648; these figures, added together, make 18; 1 and 8 are 9. Multiply 648 by itself, the product is 419,904; the sum of these digits is 27; 2 and 7 are 9. The rule is invariable, also, when any number is multiplied by a multiple of 9; as $17 \times 18 = 306$; 6 and 3 are 9; $117 \times 27 = 3,159$; these figures sum up 18, and 8 and 1 are 9. Again, $87,363 \times 54 = 4,717,422$; added together, the sum is 27; 2 and 7 are 9, and so always.

Once more, if any row of two or more figures be reversed and subtracted from itself, the figures composing the remainder will, when

An equally pleasing way to tell the number thought of, *without being informed of the total*, as in the preceding, is to ask a person to think of a number, then to double it, then add to it a certain figure mentioned, now halve the whole sum, and finally to subtract from that the number first thought of. You are then to tell the thinker what is the remainder. The key to this lock of figures is, that *half* of whatever sum you require to be added during the working of the sum is the remainder. Any amount may be added, but the operation is simplified by giving only even numbers, as they will divide without fractions. We have no room for an example; it is so simple that one trial will explain it.

A Curious Problem.—A and B, two countrymen, come to the New York market with 30 geese each. A sells his 30 geese at the rate of two for \$1, and B sells his 30 geese at the rate of THREE for \$1, at which rate the purchaser seems to get FIVE geese for \$2. / The net proceeds of the sales, however, amounted to \$25. Subsequently A and B have another lot of 30 geese each for the market, but as A is sick, he gets B to sell his lot, who comes to the market, and believing that he was selling his geese on the same terms as before, offers them at the rate of FIVE for \$2. When he returns home, he finds, in making up his account with A, that he only netted \$24 for the sixty geese, and is out \$1, but can not account for the deficiency. In the first instance, the sixty geese brought \$25; in the second, only \$24, and yet he has apparently sold them on the same terms—FIVE for \$2, as they sold them in the first place THREE

added horizontally, be a multiple of 9. Examples:

75	942	1871
57	249	1781
18=9×2	693=77×9	90=9×10

Again; if the digits 1 2 3 4 5 6 7 9 be multiplied by any multiple of 9 not exceeding two figures, the result will, curiously enough, be expressed in a *constant succession* of that figure which is the other factor of the multiplier. For instance, suppose we multiply by 36, the product of 4 and 9—then the result will be a succession of fours. Let us see:

12345679
36
74074074
37037037
44444444

Multiply by 18 and the result will be exclusively in twos; by 27 in threes; by 72 in eights; and so on. Notice also the curious combinations of figures in the product of each multiplication—the repetition of 74 and 37 above.

Set four nines in such a way that they will express 100. *Ans.*—99 9-9.

To subtract 45 from 45, and leave 45 as a remainder, see below:

$$\begin{aligned} 9+8+7+6+5+4+3+2+1 &= 45 \\ 1+2+3+4+5+6+7+8+9 &= 45 \\ 8+6+4+1+9+7+5+3+2 &= 45 \end{aligned}$$

Arrange the figures 1 to 9 in such order that, by adding them together, they amount to 100.

	15
	36
	47
It is done thus:	98
	2
	100

Subtract from six one-third of itself and leave nine. *Ans.*—rub out the letters of course, which leaves ix.

Facts for the Curious.—Under this head, we shall group striking facts on a variety of interesting topics that defy more compact arrangement:

Amount of Gold in the World.—It is estimated that all the gold in the world amounts to \$5,950,000,000—about twice our national debt. if melted together, it would make a lump of six hundred and sixty cubic yards; in other words, it could all be put into a room twenty-

seven feet square, and there would be considerable room not occupied! The annual average product of gold at the commencement of the Christian era is estimated at \$8,000,000; at the discovery of America this product had diminished to \$100,000; in 1600, it had increased to \$2,000,000; in 1700, to \$5,000,000; in 1800, to \$15,000,000; in 1843, to \$34,000,000; in 1850, to \$38,000,000; in 1853, to \$236,000,000. There was a subsequent falling off, so that in 1860 the product was only \$210,000,000. The average annual loss by the wear of coin is estimated at one-tenth of one per cent. If beaten out into gold leaf, all the gold in the world would cover an area of about ten thousand square miles—a tract a little less than the State of Vermont, and nearly equal to a fifth of either New York or Pennsylvania.

Freaks of Currency.—Many things have been used at different times as money—cowrie-shells in Africa; wampum by the American Indians; cattle in ancient Greece.

The Carthaginians used leather as money, probably bearing some mark or stamp.

FREDERICK II, at the siege of Milan, issued stamped leather money.

In 1360, JOHN the Good, king of France, also issued leather money, having a small silver nail in the center.

Salt is the common money in Abyssinia, and cod fish in Iceland.

“Living Money”—slaves, and oxen—passed current with the Anglo-Saxons in payment of debts.

MARCO POLO found, in China, money made of the bark of the mulberry tree, bearing the stamp of the sovereign, which it was death to counterfeit.

Tobacco was generally used as money in Virginia up to 1560, fifty-seven years after the foundation of that colony.

Coon skins were formerly money in Tennessee.

In 1641 the Legislature of Massachusetts enacted that wheat should be received in payment of all debts.

The Convention of France, during the Revolution, on the proposition of JEAN BON SAINT ANDREE, long discussed the propriety of adopting wheat as money, as a measure of value of all things.

Platina was coined in Russia from 1823 to 1845.

HERODOTUS says the Lydians were the first people known to have coined gold and silver. They had gold coin at the close of the ninth

century B. C. The Romans first coined silver 281 B. C., and gold 207 B. C.

The Oldest Tree in the World.—The Oldest Tree, the age of which is historically determined, is the sacred fig tree of *Anarajapoura*, in Ceylon. It was planted by DIVINIPIATISSA, in the year 288 B. C.; and its history from that date is preserved by a mass of documentary and traditional evidence. It was described by the Chinese traveler, FA HIAM, in the year 414, and by the earliest Europeans who visited it. It still flourishes, and is an object of worship to the Buddhists.

Milton's Mulberry Tree.—The principal object of attraction at Christ's College, at Cambridge, England, is a mulberry tree planted by JOHN MILTON, when he entered as undergraduate in 1633. The fact that it was planted by the great poet has been religiously handed down from his own time, in one unvarying tradition among the fellows of the college. This memorable and ancient tree, which stands on a small grass plot at the extremity of the garden, has been preserved with the greatest care, the stem, portions of which are encrusted with a covering of sheet lead, is banked up with a mound of earth covered with grass, and the branches are supported by strong props. It has weathered many a tempest. Every spring it puts forth its leaves in all the vigor of youth, and in Autumn nothing of the kind can be more delicious than its fruit.

The Largest Trees in the World.—There is no doubt that the mammoth pines of California are the largest trees in the world. They are confined to a narrow basin of two hundred acres, and are owned by Mr. LAPHAM. Measurement shows that one of the largest is ninety-four feet in circumference at the root. Another, which has fallen from old age, or has been uprooted by a tempest, is lying near it, of which the length from the roots to the top of the branches was four hundred and fifty feet. A great portion of this monster still exists, and at three hundred and fifty feet from the roots the trunk measured ten feet in diameter. By its fall, this tree has overthrown another not less colossal, since at the origin of the roots it is forty feet in diameter. "This one," says a traveler, "which appeared to me one of the greatest wonders of the forest, and compared with which man is but an imperceptible pigmy, has been hollowed, by means of fire, throughout a considerable portion of its length, so as to form an immense wooden tube of a single piece. Its size may be imagined when it is

known that one of my companions, two years ago, rode on horseback in the interior of this tree for a distance of two hundred feet, without any inconvenience. My companions and myself have frequently entered this tunnel and progressed some sixty paces, but have been arrested before reaching the end by masses of wood which had fallen from the ceiling. Near these overthrown giants others still are standing, not inferior to them in size, and of which the height astonishes the beholder. I can mention three particularly, which, entirely isolated, grow near each other so systematically as to appear to have been planted purposely to produce the effect. A fourth is remarkable in having, between fifty and one hundred feet from the ground, its trunk divided into three enormous branches of the same size and nearly parallel, extending to a distance of more than three hundred feet.

"If the largest of these were cut up for fuel, it would make at least *three thousand cords*, or as much as would be yielded by sixty acres of good woodland. If sawed into inch boards, it would yield about three million feet, and furnish enough three inch-plank for thirty miles of plank road. This will do for the product of one little seed, less in size than a grain of wheat.

"By counting the annual rings it appears that some of the oldest specimens have attained an age of three thousand years. If this computation is correct, and we see no reason to doubt it, they must have been as large as our best forest trees, in the times of HOMER and the prophet ELIJAH; and venerable and towering giants during the Carthaginian wars. In other words, 'The Roman Empire has begun and ended' since they commenced growing."

Yo-semite Falls in California.—In the deep valley Yo-semite, are several falls far surpassing in height the Falls of Niagara. At the lower end of the valley is the cascade called the Bridal Vail, the water pouring over the rocky wall a distance of nine hundred feet. Two or three miles beyond are the Yo-semite, where the water falls in three plunges, a distance of two thousand eight hundred feet, the first leap being nearly one thousand eight hundred feet, the next four hundred, and the last six hundred feet. In looking from the bottom of the gorge at the immense height from which the water descends, the stream, which is eighty-seven feet in breadth at the top, seems to be only a foot and a half wide. The Yo-semite falls are considerably higher than the famous

cataracts of Tallulah, in Georgia, which plunge a thousand feet down through a wild gorge of the Blue Ridge, forming the most picturesque water-fall scenery of the Atlantic slope.

A City on a Raft.—One of the most wonderful cities in the world is Bangkok, the capital of Siam. On either side of the wide, majestic stream, moored in regular streets and alleys, extending as far as the eye can reach, are upwards of seventy thousand neat little houses, each house floating on a compact raft of bamboos, and the whole intermediate space of the river is one dense mass of ship-junks, and boats of every conceivable shape, color, and size.

Enterprise in Africa.—In the great desert of Sahara, in the year 1860, five artesian wells were opened, around which vegetation thrives luxuriantly. Thirty thousand palm-trees and one thousand fruit trees were planted, and two thriving villages established. At a depth of little over five hundred feet, an underground river or lake was struck, and from two wells live fish have been thrown up, showing that there is a large quantity of water underneath.

The National Capital.—The dome of the capital at Washington is the most ambitious structure in America. It is a hundred and eight feet higher than the Washington Monument at Baltimore, sixty-eight feet higher than that of Bunker Hill, and twenty-three feet higher than the Trinity Church spire of New York. It is the only considerable dome of iron in the world. It is a vast hollow sphere of iron weighing 8,200,000 pounds. How much is that? More than four thousand tons, or about the weight of seventy thousand full grown people; or about equal to a thousand laden coal cars, which, holding four tons apiece, would reach two miles and a half. Directly over your head is a figure in bronze, "America," weighing 14,985 pounds. The pressure of the iron dome upon its piers and pillars is 13,477 pounds to the square foot.

Speed.—The velocity of a ship is from 8 to 12 miles an hour; of a race-horse, from 20 to 30 miles; of a bird, from 50 to 60 miles; of the clouds in a violent hurricane, from 80 to 100 miles; of sound, 823 miles; of a cannon-ball, as found by experiment, from 600 to 1,000 miles (the common estimate is much too low); of the earth round the sun, 68,000 miles (more than a hundred times swifter than a cannon-ball); of Mercury, 105,000, and of light, about 800,000,000 miles, passing from the sun to the earth, 95,000,000 miles, in about eight minutes,

or about a million times swifter than a cannon-ball; and the exceeding velocity of the thoughts of the human mind is beyond all possible estimate.

Durability of Wood.—The piles under the London bridge have been driven five hundred years, and on examining them in 1845, they were found to be little decayed. They are principally elm. Old Savoy Place, in the city of London, was built six hundred and fifty years ago, and the wooden piles, consisting of oak, elm, beech, and chestnut, were found, upon recent examination, to be perfectly sound. Of the durability of timber in a wet state, the piles of the bridge built by Emperor TRAJAN over the Danube, affords a striking example. One of these piles was taken up and found to be petrified to the depth of three-fourths of an inch; but the rest of the wood was not different from its former state, though it had been driven sixteen hundred years.

A Wonderful Clock.—A clock has been completed for the cathedral of Beauvais, France, which far surpasses all the existing specimens of the clockmaker's art. It contains no less than ninety thousand wheels, and indicates, among many other things too numerous to recite, the days of the week, the month, the year, the signs of the zodiac, the equation of time, the course of the planets, the phases of the moon, the time at every capital in the world, the movable feasts for a hundred years, the saints' days, etc. Perhaps the most curious part of the mechanism is that which gives the additional day in leap year, and which consequently is called into action only once in four years. The clock is wound up every eight days. The main dial is twelve feet in diameter, and the total cost exceeds fifty thousand dollars.

Lightning Statistics.—M. BAUDIN presented a paper to the French Academy of Science, giving some curious statistics of accidents by lightning, from which it appears that from 1835 to 1863, the number of persons killed on the spot was 2,238. From 1854 to 1863, out of 880 sufferers from lightning, only 243 were females, or a little over twenty-six per cent; in England only a little over twenty-one per cent. In many cases the lightning falling in the midst of groups of persons of both sexes, struck men in preference to women, whom it spared more or less. In a great number of cases the electric fluid killed whole herds, upward of one hundred strong, whether horned cattle, pigs, or sheep, and yet sparing the shepherds, though

they were in the midst of the herd. Of the victims by lightning at least one-fourth were struck while standing under trees.

Number to the Square Mile.—A curious bird's-eye view of the political and social state of Europe is afforded by a heavy Blue-book, published by our government, under the title of "Statistical Tables Relating to Foreign Countries." First, as to density of population, we find that while in England and Wales there are 352 inhabitants living in one square mile, in Russia there are only 10; in Norway, 12; in Sweden, 22; in Greece, 56; in Spain, 89; in Poland, 91; in Moldavia, 100; in Portugal, 104; in Denmark, 119; in Switzerland, 161; in Prussia, 165; in France, 176; in Brunswick, 194, and in Holland, 280 persons to the square mile. There are only two countries in Europe at this moment possessing a denser population than England and Wales, namely, the kingdom of Wurttemberg, in which there are 373 inhabitants to the square mile, and Belgium, with 393 persons on the same space of ground. America averages 17 persons to the square mile.

Taxes of Different Countries.—The greatly varying sums which the different nations of the world pay for their government, form very interesting points of comparison. Great Britain, it is hardly necessary to say, stands at the head of all nations in this respect, the public revenue amounting to £2 13s. per head of the population. Next in the list stands Holland, the best taxed country of the Continent, with £2 9s per head; and then follows France, with £2 0s. 8d. The inhabitants of Hanover have to pay £1 11s. 1d. each for being governed; while the subjects of King Leopold disburse £1 6s. 3d., and those of Queen Isabella £1 5s. 4d. per head for the same. In Prussia, despite its large standing army, the taxation does not amount to more than £1 2s. 3d. for each individual; while the revenue of the other states of the Confederation varies from £1 3s. to £1 per head of the population. In all the remaining countries of Europe, the burden on public taxation amounts to considerably less than £1 per head. The Danes pay 19s. 8d.; the Portuguese, 17s. 4d.; the Greeks, 16s. 8d.; the mixed races inhabiting the Austrian Empire, 16. 4d.; the Norwegians, 13s. 11d.; the Swedes, 9s. 2d.; and last of all the Swiss, only 6s 10d. per head.

Thin Sheets of Iron.—When a letter was written from Pittsburg to England on a sheet of

iron paper, so thin that it required one thousand of them piled on one another to make an inch in thickness, and only twice the weight of ordinary writing paper, and about as flexible, it set the English manufacturers to making experiments in that direction, which have resulted in producing a sheet so thin that four thousand eight hundred of them are required to make an inch in thickness—by far the thinnest ever seen by mortal eye. The thinnest tissue paper on sale measures the one-twelve-hundredth part of an inch; fancy, then, a sheet of iron but one-fourth as thick, and, nevertheless, perfect throughout! A sheet of Belgian iron, supposed hitherto to have been the thinnest yet rolled, is the one-six-hundred-and-sixty-sixth part of an inch thick, while the thickness of an ordinary sheet of note paper, is about the one-four-hundredth part of an inch.

Eccentricities of Great Men.—TYCHO BRAHE the astronomer, changed color and his legs shook under him on meeting with a hare or a fox. Dr. JOHNSON would never enter a room with his left foot foremost; if by mistake it did get in first, he would step back and place his right foot foremost. JULIUS CÆSAR was almost convulsed by the sound of thunder, and always wanted to get in a cellar or under ground to escape the dreadful noise. To Queen ELIZABETH the simple word "death" was full of horrors. Even TALLEYRAND trembled and changed color on hearing the word pronounced. Marshal SAXE, who met and overthrew opposing armies, fled and screamed in terror at the sight of a cat. PETER the Great could never be persuaded to cross a bridge, and, though he tried to master the terror, he failed to do so; whenever he set foot on one he would shriek out in distress and agony. BYRON would never help any one to salt at the table, nor would he be helped himself; if any of the article happened to be spilled on the table, he would jump up and leave his meal unfinished.

STATISTICS OF AMERICAN FARMS.

The following interesting table is compiled from the Census Report of 1860. It gives the total national area; the amount of land in farms; and the number of inhabitants to the square mile in each State:

STATES.	ACRES OF LAND IN FARMS.		Acres of land not in farms.	Total area in acres of land.	No of inhabitants to each square mile.
	Improved.	Unimproved.			
Alabama.....	6,385,724	12,718,821	13,357,535	32,462,080	19
Arkansas.....	1,983,245	7,490,735	23,833,011	33,406,720	8
California.....	2,408,051	6,262,000	112,217,406	120,887,456	2
Connecticut.....	1,829,807	675,157	555,763	3,060,660	96
Delaware.....	637,055	397,252	352,465	1,386,800	52
Florida.....	601,215	2,266,015	2,011,272	37,931,520	2
Georgia.....	8,032,758	18,587,752	10,669,510	37,120,000	18
Illinois.....	13,066,571	7,815,565	11,550,111	35,462,460	33
Indiana.....	8,212,853	8,114,109	5,494,688	21,637,760	30
Iowa.....	3,797,572	6,277,115	2,518,893	35,228,800	12
Kansas.....	405,468	1,272,932	30,463,120	32,001,500	1
Kentucky.....	7,211,708	11,514,063	1,951,939	21,116,260	31
Louisiana.....	2,707,108	6,404,168	17,162,861	26,461,440	17
Maine.....	2,701,153	3,035,798	1,472,329	22,400,000	17
Maryland.....	1,022,267	1,833,941	2,847,789	7,119,360	61
Massachusetts.....	2,116,142	1,185,212	1,653,256	4,952,000	147
Michigan.....	3,156,258	2,155,518	29,057,506	36,128,610	15
Minnesota.....	336,749	2,155,518	3,575,872	33,198,410	12
Mississippi.....	5,136,750	10,775,329	11,600,155	37,120,000	18
Missouri.....	6,210,871	1,377,329	21,831,120	41,841,000	18
New Hampshire.....	2,713,934	1,297,591	1,291,755	3,693,201	35
New Jersey.....	1,911,111	1,079,081	2,311,275	5,321,800	80
New York.....	11,788,005	1,613,755	9,165,062	30,680,000	82
North Carolina.....	6,717,881	12,215,565	8,687,991	32,141,440	19
Ohio.....	11,625,891	7,815,515	5,101,819	35,566,910	58
Oregon.....	896,111	1,164,155	589,121	10,957,300	0.5
Pennsylvania.....	10,465,275	6,548,844	12,127,900	39,199,000	111
Rhode Island.....	339,128	186,066	211,016	865,680	103
South Carolina.....	4,572,000	11,623,869	5,561,081	29,100,000	21
Tennessee.....	6,795,537	13,553,828	8,514,855	29,181,000	20
Texas.....	2,660,781	22,093,217	150,243,312	177,947,800	2
Vermont.....	2,825,157	1,174,357	1,561,366	6,555,800	50
Virginia.....	11,437,821	19,679,215	8,118,214	39,257,280	26
Wisconsin.....	3,746,167	4,117,420	26,617,775	31,511,260	11
Territories, including District of Columbia.....	162,649,818	241,913,859	750,191,121	1,154,754,610	17
	460,872	2,158,117	769,233,111	771,832,160	(*)
Total States and Territories.....	163,110,720	244,101,818	1,519,424,262	1,926,636,800	.....

More than an average of four square miles to each inhabitant.

Our Exports.—The United States Agricultural Report for 1863 reveals the fact, which accords with the public impression, that we are steadily growing richer in every section of the country. In the export of produce, our ante-war condition seems to be fully restored.

To begin with cotton. The following table shows the value of cotton exports—raw material and manufactured goods—for the last thirteen years:

YEARS.	Value of cotton exports.	Value of cotton manufactures exported.
1850.....	\$128,332,351	\$6,967,309
1851.....	131,608,881	6,115,177
1852.....	131,286,604	5,651,504
1853.....	141,131,724	5,205,222
1854.....	191,806,555	10,231,736
1855.....	84,051,483	1,057,638
1856.....	1,180,112	2,937,164
1857.....	6,652,405	2,906,111
1858.....	9,685,854	1,155,901
1859.....	5,730,119	5,311,352
1860.....	281,287,527	7,700,125
1861.....	201,470,423	8,108,417
1862.....	132,850,733	4,571,651

Even the South is richer in this one article since the war than before—a fact which it seems hard to impress on most people.

We pass on to the breadstuffs, and present a

table showing the total value of these exported during the last thirteen years:

YEARS.	Wheat.	Flour.	All bread-stuffs.
1850.....	\$5,115,591	\$29,275,148	\$4,000,210
1851.....	22,210,572	57,832,313	77,062,885
1852.....	4,011,701	19,285,884	23,297,585
1853.....	2,814,132	11,433,594	14,247,726
1854.....	4,011,701	15,118,507	19,130,208
1855.....	7,870,611	21,075,817	28,946,428
1856.....	12,575,295	27,534,677	40,109,972
1857.....	6,751,195	28,566,069	35,317,264
1858.....	31,121,153	25,588,210	56,709,363
1859.....	19,365,192	27,232,031	46,597,223
1860.....	2,814,132	18,500,686	21,314,818
1861.....	7,882,719	18,800,715	26,683,434
1862.....	50,216,632	20,887,798	71,104,430

Now for corn, the next great staple, we have a table showing the value for the same period of the exports of corn and cornmeal:

YEARS.	Corn.	Cornmeal.	Total value.
1850.....	\$7,622,555	\$1,177,088	\$8,799,643
1851.....	5,418,126	977,791	6,395,917
1852.....	3,250,609	877,692	4,128,301
1853.....	1,223,761	991,292	2,215,053
1854.....	2,260,868	912,075	3,172,943
1855.....	6,891,855	692,033	7,583,888
1856.....	10,587,582	738,211	11,325,793
1857.....	10,712,701	1,613,272	12,325,973
1858.....	3,337,580	1,349,765	4,687,345
1859.....	3,679,133	1,489,686	5,168,819
1860.....	11,070,345	1,129,484	12,200,829
1861.....	14,871,092	1,553,585	16,424,677
1862.....	13,091,036	2,008,430	15,099,466

INTEREST TABLE,

Showing the Interest from \$10 to \$5,000, for fifteen days, one month, and one year, at seven per cent.

Dollars.	15 days.	1 Month.	1 Year.	Dollars.	15 Days.	1 Month.	1 Year.
\$ 10	\$0 03	\$0 06	\$0 70	\$ 200	\$0 58	\$1 17	\$14 00
20	0 06	0 12	1 40	300	0 85	1 75	21 00
30	0 09	0 18	2 10	400	1 15	2 33	28 00
40	0 12	0 23	2 80	500	1 44	2 92	35 00
50	0 14	0 29	3 50	1000	2 88	5 83	70 00
60	0 17	0 35	4 20	2000	5 75	11 67	140 00
70	0 20	0 41	4 90	3000	8 63	17 50	210 00
80	0 23	0 47	5 60	4000	11 51	22 33	280 00
90	0 26	0 53	6 30	5000	14 38	29 17	350 00
100	0 29	0 58	7 00				

INTEREST PER DAY.

\$1000.....\$0 12	\$500.....\$0 12	\$2000.....\$0 38	\$7500.....\$1 31
200.....0 04	100.....0 13	3000.....0 58	8000.....1 31
300.....0 05	200.....0 15	4000.....0 77	9000.....1 31
400.....0 06	300.....0 17	5000.....0 96	10000.....1 31
500.....0 09	400.....0 19	6000.....1 15	20000.....2 61

The Names of Days.—The idols which our Saxon ancestors worshiped—from which the days of the week derive their names—were various, and were the principal motives to their adoption.

The Idol of the Sun.—This idol, which represented the glorious luminary of the day, was the chief object of their worship. It is described as the bust of a man upon a pillar, with a face like the sun, holding, with outstretched arms, a burning wheel before his breast. The first day of the week was especially dedicated to its adoration, which they termed the *Sun's Day*, hence is derived the word Sunday.

The Idol of the Moon.—The next was the idol of the moon, worshiped on the second day of the week, called by them *Moon's Day*; and since by us Monday. The form of this idol is intended to represent a woman habited in a short coat and a hood, having two long ears. The moon which she holds in her hand represents the quality.

The Idol of Tuisco.—TUISCO was first deified as the father and ruler of the Teutonic race, but in course of time he was worshiped as the son of Earth. From this came the Saxon word *Tuisco's Day*, which we call Tuesday. He is represented as standing on a pedestal, an old venerable sage, clothed in the skin of an animal, holding a scepter in his right hand.

The Idol of Woden, or Odin.—WODEN, or ODIN, was the supreme divinity of the Northern nations. This hero is supposed to have emigrated from the East, but from what country, or at what time, is not known. His exploits form the greater part of the mythological creed

of the Northern nations, and his achievements are magnificent beyond all credibility. The name of the fourth day of the week, called by the Saxon's *Woden's Day*, and by us Wednesday, is derived from this personage. WODEN is represented in a martial attitude, with a broadsword uplifted in his right hand.

The Idol Thor.—THOR, the eldest and bravest of the sons of WODEN and FRIGA, was, after his parents, considered the greatest among the Saxons and Danes. To him the fifth day of the week, called by them *Thor's Day*, and by us Thursday, was consecrated. THOR is represented as sitting upon a throne with a crown of gold upon his head, adorned with a circle in front, wherein were set twelve bright, burnished gold stars, and with a regal scepter in his right hand.

The Idol Friga, or Frea.—FRIGA, or FREA, was the wife of WODEN, or ODIN, and next to him, the most revered divinity among the heathen Saxons, Danes, and Northern nations. In the most ancient times, FRIGA, or FREA, was the same with the goddess HERTHA, or EARTH. To her the sixth day of the week was consecrated, which by the Saxon's was written *Friga's Day*, corresponding with our Friday. FRIGA was represented with a drawn sword in her right hand and a bow in her left.

The Idol Seater.—The idol SEATER is represented on a pedestal, whereon is placed a perch, on the sharp prickled back of which he stood. His head was uncovered, and his visage lean. In his left hand he held up a wheel, and in his right hand was a pail of water, wherein were flowers and fruits; and his dress consisted of a long coat, girded with linen. The appella-

tion given to the day of his celebration is still retained. The Saxon's named it *Seater's Dæg*, which we call Saturday.

Names of the Months.—The names of the months were given by the Romans.

January was named from JANUS, an ancient king of Italy, who was deified after his death, and derived from the Latin word *Januarius*.

February is derived from the Latin word *Febru*, to purify; hence *Februarius*—for this month the ancient Romans offered up expiatory sacrifice for the purifying of the people.

March, anciently the first month of the year, is derived from the word MARS, the god of war.

April is so called from the Latin *Aprilus*, *i. e.*, opening; because in this month the vegetable world opens and buds forth.

May is derived from the Latin word *Majores*, so called by ROMULUS in respect for the senators; hence, Maius or May.

June, from the Latin word *Junius*, or the youngest of the people.

July is derived from the Latin word *Julius*, and so named in honor of JULIUS CESAR.

August was so called in honor of AUGUSTUS, by a decree of the Roman senate.

September, from the Latin *Septem*, or seventh month from March.

October, from the Latin *Octo*, eighth month from March.

November, from the Latin word *Novem*, nine; being the ninth month from March.

December, from the Latin *Decem*, ten; so called because it was the tenth month from March, which was formerly the manner of beginning.

Curious Facts of History.—The earliest known chronicles are those of the Chinese, Hindoos, and Jews. The Chinese record an eclipse in the year 2800 B. C., and a conjunction of the planets in 900 B. C. The Hindoos claim still to have observations recorded three thousand one hundred and eighty years before the Christian era—some seven or eight hundred years before Moses' deluge; and these reported observations agree with the most accurate modern tables. The Persians also describe the position of stars in the equinox, 3000 B. C. Of course these nations wrote their observations; therefore, it is probable that CADMUS, the Phœnician, who is called the inventor of letters, brought his knowledge from the East.

On the tomb of a Phœnician, found during the reign of JAMES I, it is stated that "he and his wife are with the blessed in Elysium."

It seemed to have been engraved about 170 B. C.

JULIUS CÆSAR usurped the supreme power of Rome about 48 B. C., and from that time to 475, there were sixty-four Roman emperors, forty-five of whom were monsters of vice and crime. Before the year 400 A. D., forty-four of these had been assassinated, murdered, or publicly burnt at the stake; one had been struck by lightning, one had been drowned, and three had committed suicide! What a picture of depravity! What a lesson to that ambition that seeks to ride upon the people's necks!

Before the art of printing crept from China into Europe, books were of an incredible price. It required the labor of two years of a faithful copyist to transcribe the Bible, and hence copies of it were very costly. PLATO, who was not rich, paid 10,000 denarii, or about \$1,600, for three books of PHILOLAUS, the Pythagorean; and ARISTOTLE paid three Attic talents, nearly \$3,000, for a few books which had belonged to the philosopher SPEUSIPPUS. PLINY refused what was equivalent to about \$16,000 for his common-place book—*Electorum Commentarii*. When publicly exposed, books were frequently protected by chains, and in some ancient libraries, they are chained to this day; they were subjects of grave negotiation; and were only loaned to the higher orders, upon ample pledges of deposit for their safe return. We are told, that even so late as 1471, LOUIS IX was compelled by the faculty of medicine at Paris, to deposit a valuable security, and give a responsible indorser, in order to obtain the loan of the works of RHASIS, an Arabian physician. It is not strange, therefore, that the solemn injunction was often, in former ages, written upon the fly leaf, "Cursed be he who shall steal, or tear out the leaves, or in any way injure this book." The materials upon which the earliest books were written were paper made of the Egyptian papyrus plant, the inner bark of trees, skins, palm leaves, wood, stone, ivory, lead, and other metals.

Several centuries after CHARLEMAGNE, who died early in the ninth century, the German tribes considered no knowledge of use, but that of managing the lance and the steed. The barbarism was so great, that most of the laity, even the most distinguished, could scarcely read or write. He who was instructed in these was considered a distinguished scholar, and he who obtained more knowledge, particularly in mathematics or natural science, exposed himself to the danger of being burnt as a sorcerer.

From the sixth to the thirteenth century many bishops could not read, and kings were scarcely able to sign their names. MACAULAY tells us, that in the twelfth or even in the fourteenth century, there was, through the greater part of Europe, very little knowledge, and that little was confined to the clergy. Not one man in five hundred could have spelled his way through a psalm. In the time of CHARLES THE SECOND, few English country squires could write their names—the peasantry, none of them. Of the wits about his court, few or none could spell with decent correctness; and the great Duke of Marlborough, we know, could scarcely spell at all.

By the Salic law of France, no female can succeed to the throne. Kings have always ruled the realm—but women have generally ruled the kings.

In the reign of ELIZABETH, a house, in a country town, rented for about \$2 per annum, and could be purchased for \$30. Wheat was twenty cents a bushel; oats, fourteen cents; an ox, \$6; and a fat sheep fifty cents. Labor was five cents a day.

The Saxons were so called from their battle-axes, or *seax*.

The British peasantry were so often sold as slaves in the Saxon-Norman times, that children were sold in Bristol market for exportation.

EDMUND IRONSIDE and CANUTE settled their quarrels as all kings ought. They met to fight in single combat with swords, in the isle of Alney, and after a few blows, they shook hands and agreed to divide the subject of contest (the kingdom of England), EDMUND taking the south and CANUTE the north.

The ancient English kings of the Tudor line, used to keep minstrels and jesters for entertainment; JAMES I converted them into poets-laureate.

Villain, in ancient times, meant merely a country laborer.

At the time of the violent dissolution of the religious houses by Henry VIII, estates left to them *in trust*, by pious persons, for the poor and other objects of charity, worth a million pounds per annum (now worth fifty millions per annum), were confiscated by the king and divided among his servile parliament, noblemen, and courtiers, and their descendants still enjoy the money.

Esquires were the shield-bearers among the Greeks and Romans; now the title is conferred on all who wear a clean shirt.

The following old rhymes, still current in England, serve to assist in remembering the names of the monarchs. The line begins with the Norman conquest:

"First WILLIAM the Norman, then WILLIAM his son,
HENRY, STEPHEN, and HENRY, and RICHARD, and JOHN;
Next HENRY the Third, EDWARDS one, two, and three,
And again, after RICHARD, three HENRYS we see.
Then followed two EDWARDS and RICHARD the less,
Two HENRYS, Sixth EDWARD, Queen MARY, Queen BES;
Then JAMIE the Scotchman, and CHARLES, whom they
slew,
And again, after CROMWELL, another CHARLES too.
Then JAMES the Second ascended the throne;
And WILLIAM and MARY together came on.
Queen ANNE; GEORGES four, King WILLIAM now past;
Then comes good VICTORIA—may she long be the last!"

Statistics of the Bible.—The Bible has been translated into 148 languages and dialects, of which 121 had, prior to the formation of the British Foreign Bible Society, never appeared in print. And twenty-five of these languages existed without an alphabet, in an oral form. Upward of 43,000,000 of these copies are circulated among not less than 600,000,000 of people.

The first division into chapters and verses is attributed to STEPHEN LANGTON, Archbishop of Canterbury, in the reign of King JOHN, in the latter part of the twelfth century or the beginning of the thirteenth. Cardinal HUGO, in the middle of the thirteenth century, divided the Old Testament into chapters, as they stand in our translation. In 1661, ATHIAS, a Jew of Amsterdam, divided the sections of HUGO into verses—a French printer had previously (1561) divided the New Testament into verses as they are at present.

The entire Bible contains 66 books, 1,188 chapters, 31,185 verses, 774,692 words, 3,556,480 letters. The name JEHOVAH, or LORD, occurs 6,555 times in the Old Testament. The shortest verse in the Bible is John 11:35. The 19th chapter of 2d Kings and Isaiah 37 are the same—probably the error of some early transcriber. In the 21st verse of the 7th chapter of Ezra are all the letters of the Alphabet, I and J being considered as one.

There is a Bible in the library of the University of Gottingen written on 5,476 palm leaves.

A day's journey was 33 1/5 miles. A Sabbath day's journey was about an English mile. Ezekiel's reed was about eleven feet, nearly. A cubit is twenty-two inches, nearly. A hand's breadth is equal to three and five-eighths inches. A finger's breadth is equal to one inch. A shekel of silver was about 50 cents. A shekel

of gold was \$8.09. A talent of silver was \$516.32. A talent of gold was \$13,809. A piece of silver or a penny was thirteen cents. A farthing was three cents. A *gerah* was one cent. A mite was one and a half cents. A homer contains seventy-five gallons and five pints. A hin was one gallon and two pints. A firkin was seven pints. An omer was six pints. A eab was three pints. A dog was one-half pint.

The divisions of the Old Testament are four: 1. The Pentateuch, or the Five Books of Moses. 2. The historical books, comprising Joshua to Esther, inclusive. 3. Poetical or doctrinal books, from Job to Songs of Solomon, inclusive. 4. Prophetical books, from Isaiah to Malachi, inclusive.

The New Testament is usually divided into three parts: 1. Historical, containing the four Gospels and Acts. 2. Doctrinal, comprising all the epistles from Romans to Jude. 3. Prophetical, being the book of Revelations of St. John.

The commemorative ordinances of the Jews were: Circumcision, the seal of the covenant with Abraham; the Passover, to commemorate the protection of the Israelites, when all the first-born of the Egyptians were destroyed; the Feast of the Tabernacles, instituted to perpetuate the sojourning of the Israelites for forty years in the wilderness; the Feast of Pentecost, which was appointed fifty years after the Passover, to commemorate the delivery of the Law from Mount Sinai; Feast of Purim, kept in memory of the deliverance of the Jews from the wicked machinations of Haman.

In 1272 it would have cost a laboring man thirteen years of labor to purchase a Bible. as his pay would be only 1½d. per day, while the price of a Bible was £20.

The Apocrypha of the Old Testament contains 14 books, 183 chapters, and 15,081 verses.

History of the Bible.—The apocryphal books of the Old Testament generally stand by themselves after the canonical books, in early editions of the Bible. From recent Protestant editions they are generally omitted, as the Protestant Church holds the opinion of the Hebrews, that these books were not inspired. But at the Council of Trent, 1545, the Catholic Church, which body always regarded the apocryphal books with favor, formally pronounced them to be canonical—that is, of full inspiration—and adopted them as a part of the Catholic Bible—the Vulgate. Some of them, like the three books of the Maccabees,

are of great historical value, but it is thought by Jews and Protestants that they were written after the period of inspiration was declared to be closed—that is, about the time of Daniel.

No such strict views as are now entertained seem to have prevailed in the early ages of the Church. The different collections of Scripture writings did not agree, and there was none that was deemed of supreme authority. The right of private judgment was permitted and encouraged, and we find the most distinguished theologians, from the second to the sixteenth century, deciding for the selves what books were inspired, and constructing catalogues of their own. HILARY, who was canonized for his zeal in defense of orthodoxy against Arianism, assigned as a reason for adding the apocryphal books of Tobit and Judith to the Greek Bible, that the Jews had twenty-two canonical books because they had twenty-two letters in their alphabet; and, therefore, because the Greeks had twenty-four letters they should have twenty-four canonical books. Saint JEROME, who prepared a famous Latin version of the New Testament, seems to have taken the same view.

The Canon of the New Testament—that is, the approved list of inspired books—was very slow in forming. For a century, the early Christians had no Bible, except the Old Testament, which they had received from the Hebrews. The letters of the Apostles, and at least two of the Gospels, were read publicly from time to time, and were listened to with profound respect. Gradually, such epistles as were addressed to neighboring churches were gathered together in small collections; and later, other works of an historical or a poetical character, which might recommend themselves by their intrinsic worth or their reputed authorship, were received and used by such churches as came in possession of them. The duplicates were few, and the scribes exhibited a care and vigilance now unknown to copyists.

The earliest trace of a collection of New Testament books is found in that which MARCHION—a Gnostic in religious belief—had in the middle of the second century, consisting of ten Epistles of Paul, and a Gospel supposed to have been LUKE'S. Half a century later, the principal Christian teachers made a more complete collection. In this, the Revelation was included under protest; there was also a difference of opinion respecting Philemon, Jude, 2d John, and the Epistle to the Hebrews.

An ancient canon, constructed about the year 200, omits James and Hebrews. ORIGIN (in

240) thought the Shepherd of Hermas (one of the books included in the present Apocryphal list) to be "divinely inspired," but was in some doubt about Hebrews, James, 2 Peter, 2 and 3 John, and Jude. EUSEBIUS, the father of Church history, assigned to these books about the same place. JEROME, speaking of the letter to the Hebrews, says: "It is no matter who wrote it, for it is the production of an ecclesiastical man, and is daily distinguished by being read in the churches." For the same reason, he would admit the Apocalypse, then regarded with general disfavor. The Council of Hippo, in 393, and the Council of Carthage, in 397, decided, by a vote of the bishops, on the inspiration of the different New Testament books, and arranged those which were adopted, as we now find them; and Pope INNOCENT confirmed their catalogue by a decree. This finished the canon of the New Testament.

The apocryphal books of the New Testament rejected by the Council of Hippo as not inspired, are now seldom seen except by antiquarians. They consist of numerous writings, partly historical and partly doctrinal, attributed to JESUS CHRIST and his apostles, and their disciples and companions; the latest of them originating probably as early as the second or the third centuries. They bear the name of Acts, Epistles, Revelations, etc.; the most important are the pseudo-gospels.

At the Reformation, differences of opinion about the genuineness of certain books of the Bible broke out again. Being no longer restrained by an infallible papal decree, scholars ventured once more to subject the Scriptures to the rules of philological criticism. MARTIN LUTHER raised a doctrinal test, and insisted that it should exclude Hebrews, James, Jude, and the Apocalypse. The book last mentioned, called the Revelation of St. John the Divine, according to the theory that it was written by that Apostle in his youth, has always been the theme of much controversy, not only as to its origin, but its meaning. By some it is supposed to be a poem; by others a prophecy; and it has been made the foundation of most of the grotesque religions of the world. But a critical examination of the genuineness of certain books has never produced any change of the canon as adopted by the Council of Hippo, and ratified by the Papal manifesto.

The Bible now generally used by Protestants was translated by forty-seven of the most distinguished scholars of England, under the patronage of King James, in the early part of

the seventeenth century. Ten at Westminster were to translate to the end of II Kings; eight at Cambridge were to finish the remaining historical books and the hagiographa (the books following Psalms); at Oxford, seven were engaged on the Prophets. The four Gospels and the Acts, and Apocalypse, were allotted to a company of seven at Westminster, and the Apocryphal books were assigned to a company at Cambridge. The whole class then compared all the translations, and adopted the readings agreed on by the majority. The Book thus finished was sent to each of the other classes; and the whole was finally revised by a select committee of six in London.

It is to be remarked, however, that at the time of the KING JAMES' translation, the earliest existing Greek manuscripts of the New Testament had not been discovered; and that version was necessarily made from copies written after the tenth century. Since the adjournment of the Forty-seven translators, several manuscript copies of the New Testament of a much earlier period have come to light, seeming to exhibit some inaccuracies in their completed work.

Twenty years after the translation was finished, the *Codex Alexandrinus*, a Greek manuscript, supposed to have been written about A. D. 450, was presented to King CHARLES. In 1828, scholars were for the first time granted access to the *Codex Vaticanus*, a Greek manuscript in Rome, bearing evidence of having been written as early as A. D. 350. Both copies are imperfect, having lost several books.

In 1844, CONSTANTINE TISCHENDORF discovered, in a monastery on Mount Sinai, a Greek manuscript of the New Testament complete, without a leaf missing. In 1859 he succeeded in transferring the copy to the Emperor ALEXANDER, of Russia. It bears evidence of a very early origin, and scholars decide that it was written as early as A. D. 350—perhaps even earlier than the Vatican manuscript, with which it nearly agrees.

These two manuscripts are doubtless considerably older than any other manuscript of the New Testament in existence, and their anterior origin gives them authority in cases where the text of the KING JAMES' version has a different reading.

In January, 1869, there was published in London an English New Testament of the KING JAMES' edition, "with an introduction and various readings from the three most celebrated manuscripts of the original Greek text,

by CONSTANTINE TISCHENDORF." The "various readings" are contained in notes at the bottom of the page.

The Catholic Church teaches not only the infallibility of the Bible, but the infallibility of tradition in transmitting it, and the infallibility of the Church in interpreting it. For this latter purpose, Councils of ecclesiastical dignitaries have been convened, by Emperor or Pope, from time to time, believed to be presided over personally by the Holy Ghost. Among these the most remarkable are: 1, The Council of Nice, in 325, by which the dogma affirming the deity of the Son of God was adopted; 2, that of Constantinople, 381, by which the doctrine concerning the Holy Ghost was decided and proclaimed; 3, that of Carthage, 397, by the vote of which it was determined what books were miraculously inspired; 4, that of Ephesus, 431; and 5, that of Chalcedon, 451, in which two last the doctrine of the virginity of MARY and the union of the divine and human nature in CHRIST were more precisely set forth. These Councils are called Ecumenical, and their decisions in matters of faith were held to be infallible.

America before Columbus.—America is, historically, the New World; but naturalists tell us that it is geologically the oldest world; and they still trace a ridge of granite from the ocean to the great lakes which "in the beginning," was the first to spring above the molten globe, destined to become the resting-place of fauna and flora, and at last the footstool of man. Of the first peopling of the continent, nothing is now known; the problem is left to conjecture.

Earliest European Discoveries.—Before the last quarter of a century, it was generally supposed that Columbus was the first European who set foot on this continent; but it is now admitted by scholars that the Northmen (or Normans) of Scandinavia, had previously made five or six voyages hither, and effected settlements at different points on the coast of what is now the United States, hundreds of years before. Now that the exploit of the Norwegians is attested by documentary evidence and generally acknowledged, it seems just what might have been expected. They were enterprising far beyond their contemporaries. They possessed the best nautical skill of the age. They knew how to build substantial ships and how to navigate them. They were hardy and bold—akin to the stock whence the Anglo-Saxon race is sprung.

Northmen in Greenland.—Iceland was made known to the Northmen in 860 by a Swede named GARDAR, and four years later by the pirate NADODD, who named it Snowland. The island was settled in 875, by a Norwegian jarl driven away from home by a tyrannical king. In 982, ERIC the Red, who had been outlawed for manslaughter, built and manned a stout ship and pushed boldly out from Iceland "in search of the land lying in the ocean at the West." He found a great peninsula, which he explored during his exile of three years, when he returned and announced the discovery of a beautiful land, which he called "Greenland," in order, he said, to attract settlers by the pleasing name.

Remaining a year with his countrymen, he sailed once more to Greenland, in 986, with a fleet of thirty-five ships, only fourteen of which reached their destination. Many colonists followed, however, and the best parts of the west side of the peninsula were soon settled. In the year 1000, LEIF, son of ERIC, made a voyage to Norway, where he embraced Christianity, and returned to Greenland accompanied by a number of priests. The new religion made rapid inroads upon paganism. ERIC and THORHILD, his wife, were converted—ERIC, apparently, much against his inclinations—and THORHILD built a church, known far and wide by her name. Other churches were built, and their ruins remain to this day. In 1112, ERIC GUNPSON, of Iceland, was sent to Greenland as bishop of that flourishing colony. He was followed during the next three hundred years by seventeen bishops successively, the last of whom was consecrated in Norway, in 1408, and was never heard of after going away.

At last, probably before COLUMBUS was born, the colony in Greenland perished. To the present day numerous monuments and ruins attest its existence and prosperity. The ruins of the Cathedral of Gardar are fifty-one feet long and twenty-five wide, and its stone walls are four feet thick. The following Runic description found on a stone is one of the most interesting relics of the early pioneers: "ERLING SIGHEATSON and BIRON THORBARSON and EINDRID ODDSON, on Saturday before Ascension week, raised these marks and cleared ground, 1135." Thus, after an occupation of Greenland for more than three hundred years, the American colony of Swedes became utterly extinct.

Other Discoveries Southward.—During the life of the Greenland colony, explorations and set-

tlements had been made at different points along the coast of North America in the temperate zone. The record of these voyages and discoveries still exists in the original manuscript—the Norland Sages, written more than a century before the age of Columbus.

Greenland seems, naturally enough, to have been the starting-point of the brave voyagers who so early explored the coast of what is now the United States; and the leaders in every expedition were the descendants of ERIC, the Red, or comrades who had caught their dauntless spirit.

In the ancient manuscripts referred to, begun in 1100, and finished in 1400, are narratives of eight voyages to the main land of North America—the first, that of BJARNE HERIULFSON in 986, and the last, that of ADALBRAND in 1225.

There are given two versions of the voyage of BJARNE, which concur in representing that he was sailing for Greenland to join his father in 986, when he was driven away southward by a storm; he sailed many days enveloped in a fog, and knew not whither he was going, for he could not distinguish the quarters of the sky; at last he made land "covered with wood and small hills inland." He kept off, and sailed other days and saw land again "flat and covered with trees," but no snow mountains like those he was in search of. Finally, the sky cleared, he turned his prow, discovered a snowy land, which, however, was not Greenland, and, after a tedious voyage northward, made Greenland, and found his father with ERIC. None of the party had left the ship.

Fourteen years later, in the year 1000, LEIF, son of ERIC, who, as a youth, had brought the priests to Greenland, sailed southward to find the land which BJARNE saw. He sailed in BJARNE's vessel, which he had bought, and manned with thirty-five men. They first came to the land which BJARNE had last discovered, and LEIF, saying that the people at home should not taunt him, as they had his predecessor, in finding a land but not venturing to put his foot on it, went upon the snowy and barren shore, and called it Helluland. This is now known as Labrador. He proceeded, and next came upon a flat country, with a low, level appearance, which he named Markland, supposed to be Nova Scotia. Again he pressed on, and in two days, with a fair wind, saw land again, and it being warm and attractive, the party went ashore to wait for a favorable return wind. They anchored in a lake, took their

beds ashore, and set up their tents. Here they found salmon and game; also, to their great delight, grapes. The next Spring they built houses; but during the year they loaded the ship with fodder and timber, and returned to Greenland. The new land was named Vinland, and is supposed to have been the eastern shore of Cape Cod.

The next year, 1002, THORVALD, another son of ERIC (who died this year), took the vessel of LEIF and went to Vinland, where he and his crew dwelt in the huts already built, and lived by fishing. They remained two years, when they proceeded northward around the cape, and after some mishaps, moored the vessel at a woody point of land across the bay, now regarded as Point Alderton, below Boston harbor. THORVALD exclaimed: "Here it is beautiful; here will I set up my abode." At a little distance they saw three inverted skin boats with three sleeping savages under each, and immediately begun their intercourse with the people on whose land they were trespassers, by falling upon them with axes and killing all but one, who escaped. The same day a retaliating band of Indians caught *them* asleep in turn and assailed them with bow and arrow—one of the missiles entering THORVALD's side and causing his speedy death. They buried him on the spot he had selected for his abode, and returned to Greenland with vines and grapes. THORVALD does not seem to have added greatly to previous discoveries; but he had inaugurated the Indian policy of America, and his original method of making overtures with a battle-axe has since been generally followed. He lived eight hundred years too soon, however; what an Indian Agent he would have made for the Great Republic in these days!

In 1005, THORSTEIN, still another son of ERIC, started for Vinland with a stout vessel and an able crew, to recover his brother's body; but "they drove about the ocean all Summer without knowing where they were," and finally landed again in Greenland, remote from Ericsfiord, where THORSTEIN died.

But the most remarkable of these expeditions was made by THORFINN KARLSEFNE, an Icelander of distinguished ancestry. In 1006 he went to Greenland, where he married GUDRID, widow of THORSTEIN. Accompanied by his wife, who urged him to the undertaking, he sailed to Vinland in the Spring of 1007, with three vessels and one hundred and sixty men. They explored the coasts of Massachusetts,

Rhode Island, and probably Connecticut, with the islands off shore. On Mount Hope Bay they built a little village and stockaded it. They found grapes, corn, salmon, halibut, and eider ducks in abundance. "There were beasts on the land, eggs in the island, and fish in the sea." In the company were two Scots, who were slaves, presented by the king of Norway—the first slaves in New England. KARLSEFNE and his comrades explored a bay, probably Narragansett, fished, hunted, and prepared their little settlement for defence. They traded with the Indians and got the best of it; and, not being satisfied with that, fought with them and got the worst of it. Moreover, the little community had other troubles, not peculiar to ancient days, for the record says: "At this time they had much contention among themselves, and the unmarried women vexed the married." So KARLSEFNE, seeing the savages belligerent and aggressive, and the women turbulent, concluded that it was inexpedient to tarry longer, and returned to Greenland in 1010, having spent three years in New England.

The same Summer that KARLSEFNE and his comrades returned to Greenland, FREYDIS, a daughter of ERIC and a sister of the enterprising brothers who had discovered Vinland, led another expedition with two ships to the houses that LEIF had built. She had previously accompanied one of her brothers on the voyage. She had inherited her father's blood-thirsty spirit, and had learned her brother's Indian policy; and the company had not long been at Vinland when FREYDIS, with her husband and a few followers, fell upon her chief captains and their crews while they slept and slew them all, FREYDIS killing five women with her own hand. She remained a year in Vinland, and returned to Greenland in 1011 with her own ship and the ship that had belonged to the captains, laden heavily with timber and furs. She seems to have been a mere pirate.

There are, in the Norland manuscripts, a few scraps of history which speak of a voyage of a Bishop ERIC to Vinland, in 1121, but there is nothing farther in regard to any persistent settlement there. Allusion is also made to the re-discovery of Little Helluland (Newfoundland) in 1285, and of a voyage in 1347 to Markland (Nova Scotia), whither the Northmen came to cut timber.

A number of minor narratives likewise exist. The first refers to a visit of ARE MARSON in 983, to a country far to the southwest of

Ireland, called Great Ireland or Hvíttramanna-land (whiteman's land), where he was driven by a storm. DE COSTA, in his pre-Columbian discovery of America, thinks this land was perhaps the Azores; but Professor RAEN in his work on American Antiquities, and SMITII, in his Dialogues, agree in thinking that it was Florida or the Isthmus of Darien. BJORN ASBRANDSON is supposed to have gone to the same place in 999, and GUDLIEF in 1027.

It can not be doubted that America was discovered by the Northmen five hundred years before COLUMBUS sailed from Palos. Such a mass of concurrent testimony as the ancient Norland manuscripts present can not be impeached. The old stone mill at Newport, Rhode Island, has been supposed by Professor RAEN and other scholars to be the ruins of a place of Vinland worship, but it seems to be too modern; and, although its origin is unknown, the hypothesis of Professor RAEN can hardly be sustained. Dighton Rock, covered with chiseled inscriptions, near Taunton, Massachusetts, is far likelier to be a monument of KARLSEFNE's picture-writing. But without any remains or ruins the manuscript proof is ample.

Subsequently to the discovery of America by the Northmen, and prior to the voyage of COLUMBUS, our shores were probably visited, either intentionally or accidentally, by other Europeans.

In the year 1170, Prince MADOC, of Wales, leaving his brothers to quarrel over the heritage of the principality, is said to have fitted out a small fleet and "sought adventures by sea, sailing west, and leaving the coast of Ireland so far north that he came to a land unknown, where he saw many strange things." MADOC is supposed, by those who credit the story of the voyage, to have reached Florida or Virginia. He was so delighted with the country, as compared with the barrenness of Wales, that he returned home and "prepared a number of ships (ten sails), and got with him such men and women (300) as were desirous to live in quietness; and, taking leave of his friends, took his journey thitherward again." We quote HAKLUYT, who wrote in 1580. This is the last that was ever heard of MADOC's party. PALFREY, in his history of New England, says: "The story is not without important corroboration, furnished by recent observations of travelers among Indian tribes."

Some late writers have adduced the circum-

stance that a language resembling the Welsh was spoken by a tribe of Indians in North Carolina, and that it is still used by a nation beyond the Mississippi. We have the story of Rev. MORGAN JONES, that the Tuscaroras understood his preaching in "the British tongue" about 1660; and the statement of "one OLIVER HUMPHREYS" respecting natives somewhere near Florida who spoke Welsh and had Welsh features and complexion. BENJAMIN SUTTON, a captive in 1766, stated that he had been with the Choctaws to an Indian town, a considerable distance from New Orleans, whose inhabitants were of lighter complexion than the other Indians, and who spoke Welsh, and that they had a book among them wrapt in skins but could not read it; and that some of them spoke Welsh with one LEWIS, a captive Welshman.

The remarkable account given by Captain ISAAC STUART, in 1782, is substantially as follows: Eighteen years before he was taken prisoner by the Indians and carried to the Wabash. After two years of bondage, he and a Welsh fellow-captive named JOHN DAVID, were redeemed by a Spaniard, and accompanying him to the Red River, they traveled up that river seven hundred miles, when they came to a nation of Indians "remarkably white, with hair of reddish color." The day after their arrival, the Welshman, DAVID, declared his intention of remaining with that people, *as he understood their language*. STUART's curiosity being excited he questioned the chiefs, and learned from them that their forefathers came from a foreign country and landed beyond the Mississippi, the chiefs describing particularly the country of Florida. In proof of their story they exhibited rolls of parchment carefully tied up in otter's skins, on which were large characters written in blue ink, which the Welshman, being ignorant of letters, was unable to read.

The following is given in FILSON's Kentucky, published before Captain STUART's narrative: "Of late years the Western settlers have received frequent accounts of a nation, inhabiting at a great distance up the Missouri, in manners and appearance resembling the other Indians, but speaking Welsh, and retaining some ceremonies of the Christian worship; and at length this is universally believed to be a fact.

"Captain ABRAHAM CHAPLAIN, of Kentucky, a gentleman whose veracity may be entirely depended upon, assured the author that in the late war, being with his company in gar-

rison at Kaskaskia, some Indians came there, and speaking the Welsh dialect, were perfectly understood, and conversed with two Welshmen in his company."

CHARLEVOIX says, that in 1721, some Indians whom he calls the Aionaz (probably the Iowas), informed him "that the Omans, three days' journey from them, *had white skins and fair hair*, especially the women." CARVER also heard of a nation, about the heads of the Missouri, "rather smaller and whiter than the neighboring tribes." This testimony—and much more to the same purport might be adduced—agrees with Mr. CATLIN's account of the Mandans—a people whom SCHOOLCRAFT describes as having "blue and light brown eyes," and "much fairer than the surrounding tribes."

Some of MADOC's people may also have found their way to Mexico, for in their ancient history the Aztecs claim to have arrived in 1178, eight years after MADOC is said to have left Wales.

But none of these discoveries, from ERIC to MADOC, left any permanent impress on the continent, unless indeed, MADOC was the royal predecessor of MONTEZUMA. None of them formed a direct connecting link between the America of the red man, and the America of the white man. The voyagers had ambition, sagacity, enterprise, heroic courage, but the thick darkness of the middle ages yet enveloped Europe, and the old world was not ripe for the appropriation of the new.

The well-attested discovery of America by the Northmen, detracts in no wise from the fame of COLUMBUS, even when it is understood that he visited Iceland in 1477, and possibly heard there of the bold excursions and settlements far in the West, beyond the *Ultima Thule*. For it was still virtually an Unknown Land, and the Vinland colony had become extinct, when the illustrious Genoese, executing his well-matured scheme of opening the eastern portals of the gorgeous Indies, brought to this virgin continent the religion of his sovereign and the enlightenment of his race.

The rest of our story is known. We need not recapitulate the narratives of the bold voyagers who succeeded COLUMBUS, or of the brave pioneers who succeeded them; of the planting and settlement of the colonies in the face of every hardship and peril; of the achievement of independence, under the matchless leadership of GEORGE WASHINGTON along the Atlantic

border, and of GEORGE ROGERS CLARK in the central valleys; of the territorial expansion to five times the original domain, and the increase of population from three millions in 1776, to fifty millions in 1876. These marvels are familiar. And we need not attempt to forecast the day when the young Republic shall have reached maturity; when, from ocean to ocean, its fields, under the touch of a better husbandry will carry a population as dense as Holland; when, made wholly peaceful by an enlightened economy, made truly free by a growing self-respect, made systematically righteous by a quickened conscience, and wise by a fearless investigation, made charitable by the contact of many religions, and strong by a mingling of the blood of all the world, we may, without conceit, extend our hand to the oppressed, and without arrogance show our sister nations THE BETTER WAY.

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